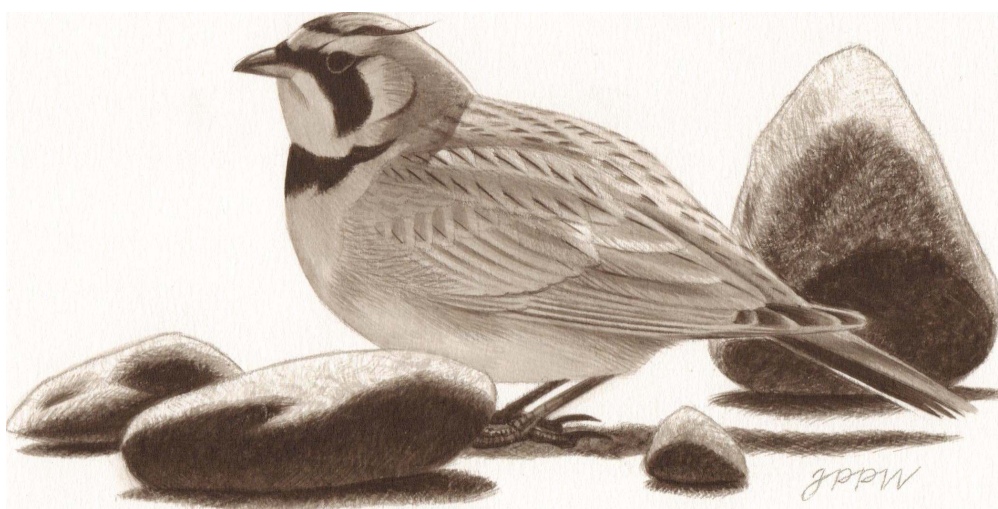


WINTERING BIRDS IN NORTHERN SAUDI ARABIA: FEBRUARY 2009 (ABBA SURVEY 40)

by

**Michael C Jennings¹, Mohammed I. Al Salamah², Baleegh Abu Qabous² and
Hajed N al Subaie².**

September 2009



¹. ABBA Coordinator, Warners Farm House , Warners Drove, Somersham, Cambridgeshire, UK, PE28 3WD. Email: Arabianbirds@dsl.pipex.com

². C/O NCWCD, PO Box 61691, Riyadh 11575, Saudi Arabia. Email: info@ncwcd.gov.sa

ABBA Survey Reports

A summary of the results of ABBA Surveys appears in *The Phoenix*, the newsletter of the ABBA Project. A full report has been prepared of some surveys which includes details of censuses and other observations, sites visited etc., have been published as follows:

Survey 4. JENNINGS, M. C., M. I. AL SALAMA & H. S. FELEMBAN. 1988. ***Report on an ornithological survey of the Asir National Park, Saudi Arabia 29 June to 18 July 1987.*** N.C.W.C.D., Riyadh Report 4. (Pp 76).

Survey 5. JENNINGS, M. C., M. O. AL TOUM & A. A. A. AL ISSA. 1988. ***Atlas of the Breeding Birds of Arabia: Survey 5, Results of an Ornithological Survey of Northern Saudi Arabia: 27 February - 26 March 1988.*** N.C.W.C.D. Technical Report 10. (Pp 65).

Survey 6. JENNINGS, M. C. & M. I. AL SALAMA. 1989. ***Results of an ornithological survey of the northern Asir & southern Hedjaz region of Saudi Arabia, 25 June - 16 July 1988.*** N.C.W.C.D. Riyadh Tech. Report No.14. (Pp 65).

Survey 7. JENNINGS, M. C., S. A. AL SHODOUKHI, T. M. AL ABASS & S. COLLENETTE. 1990. ***Results of an ornithological survey of central & north western Saudi Arabia; 12 March - 8 April 1989.*** N.C.W.C.D. Riyadh Tech. Report No.19. (Pp 82).

Survey 8. JENNINGS, M. C., I. A. ABDULLA & N. K. MOHAMMED. 1991. ***Results of an ornithological survey of South Yemen 23 October - 9 November 1989.*** N.C.W.C.D. Technical Report 25: Riyadh, South Arabia. (Pp 63).

Surveys 9 & 10. JENNINGS, M. C., A. AL KRAIRY & R. AL HARBI. 1992. ***Results of two ornithological surveys to Central Saudi Arabia, May 1990 and April- May 1991.*** N.C.W.C.D., Riyadh Technical Report 28. (Pp 60).

Surveys 11 & 12. JENNINGS, M. C., M. I. AL SALAMA & C. T. RICHARDSON. 1994. ***Results of two ornithological surveys to UAE and Oman and Northern Saudi Arabia, February-May 1992.*** N.C.W.C.D. Tech. Report No 35. (Pp.75).

Surveys 13-16. JENNINGS, M. C., M. I. AL SALAMA, A. H. AL SUHAIBANI, H. S. A. YAHYA & C. E. QIRREH. 1996. ***Results of four ornithological surveys to the southern Tihama of Saudi Arabia, north eastern Saudi Arabia, northern Oman and north western Saudi Arabia, during the period December 1992 to April 1994.*** N.C.W.C.D. Riyadh Tech. Report No.36. (Pp.65).

Surveys 17-22. JENNINGS, M. C. 2004. ***The birds of the Rub al Khali periphery: Results of six ornithological surveys to Saudi Arabia, Oman, Yemen & the UAE, March 1995-July 1997.*** ABBA Report Somersham, Cambridgeshire, UK. (Pp.87).

Survey 35. JENNINGS, M. C. 2005. ***Birds observed at Ghubrah Bowl, Saiq Plateau & Jabal Shams, Northern Oman 19 March-26 April 2005 with comments on status & population.*** Report, Sultan Qaboos University, Al Khoud. (Pp16).

WINTERING BIRDS IN NORTHERN SAUDI ARABIA: FEBRUARY 2009 (ABBA SURVEY 40)

Survey members:

Michael C Jennings (ABBA Coordinator),

Mohammed I. al Salamah, Manager Training Centre and Nature Resources Conservation, NCWCD, Riyadh, (1-6 February)

Baleegh Abu Qabous, Field Researcher, Jubail Marine Reserve, NCWCD , (6-14 February)

Hajed N al Subaie, Field Researcher, NWRC Taif (14-26 February)

SUMMARY

The northern plains of Saudi Arabia are an area of approximately 231,000 km², or roughly equivalent to the size of the whole of the United Kingdom. During previous ABBA Surveys in this area in late winter and spring significant numbers of wintering species such as Dotterel *Charadrius morinellus*, sandgrouse *Pterocles* sps and eagles and vultures have been recorded, as well as the threatened Sociable Plover *Vanellus gregarius*. The main objective of ABBA Survey 40 (30 January - 28 February 2009) was to assess wintering populations of these birds in northern Arabia through sampling methods. In all 21 timed walked censuses in the early morning and 25 driven transect counts (over a total distance of 1511 km) were carried out. Unfortunately most of the region had suffered a severe drought over an extended period, perhaps the previous ten years or longer, and in most of the survey area there had been no rain at all during the winter/spring period of 2008/2009. This lack of rain had resulted in a complete lack of green vegetation in most of the western part of the area studied. Consequently the census results showed low species diversity and small populations. The results of the walked censuses compared to results of censuses using the same methodology in the same area 15-20 years ago, showed that on average only one half the species and one fifth of the previous population were present in 2009 in comparable areas. This proportion was broadly maintained by both breeding and wintering species. There was an almost complete lack of the species which were the main objective of the survey (see above). At least one nomadic breeding species was much reduced in 2009 compared to numbers present in previous years, adding further weight to the negative effect on bird numbers of prolonged drought in this arid region. The region supports only about 16 arid land species which breed regularly. In addition there are several human commensals on farms and other opportunist species take advantage of temporary conditions during, for example, very wet years when there is a lot of vegetation. Two large irrigated arable farms in northern Arabia were also visited, these possessed a much wider avifauna of both resident and wintering species attracted by the special conditions present. Throughout the region extraordinary numbers of Eastern Imperial Eagle *Aquila heliaca* were recorded, they were mostly feeding on sheep and other stock corpses. The 63 which were counted during the driven transects suggests a wintering population in the region of 4,000 or more. This would be a very significant part of the world population. Other field work was completed in central Arabia before and after the main survey to the north. A systematic list of all birds observed in the study area and in parts of central Saudi Arabia is presented.

CONTENTS

ARABIC SUMMARY	Page 52
INTRODUCTION	Page 5
REGIONS VISITED	Page 6
Plains habitats	
Ad Dibdibah	
As Summan	
Al Hajarah	
Al Bisaita	
Jebals and areas of rock outcrops	
Jebal Tubaiq	
Al Hisma	
Sandseas	
Nefud Kebir	
Ad Dahna	
Farms in northern Arabia	
NADEC farm, Wadi Serhan (Al Bisaita)	
TADCO farm	
Other sites visited in northern and central Arabia (Al Jauf lake, Jebal Selma, Al Hair watercourse, Todhia farm)	
METHODS	Page 12
Early morning walked transect census	
Driven transect counts	
RESULTS	Page 22
Introduction	
Birds recorded during walked morning censuses	
Birds recorded during driven transect counts	
Populations of birds in northern Saudi Arabia in February 2009	
Birds recorded at NADEC and TADCO farms	
Birds recorded outside the main study area at sites in northern and central Saudi Arabia (Al Jauf, Jebal Selma, Al Hair watercourse, Todhia farm)	
DISCUSSION AND CONCLUSIONS	Page 35
Conditions	
Comparison of walked morning censuses in 2009 to previous years	
Populations of some resident birds species in northern Saudi Arabia in February 2009	
Populations of winter visiting species in northern Saudi Arabia in February 2009	
Breeding birds: Changes to breeding ranges noted in February 2009 and other records	
Birds on farms	

ACKNOWLEDGEMENTS	Page 41
REFERENCES	Page 42
APPENDICES	
1. Gazetteer	Page 43
2. Summary of species observation in systematic order	Page 44
3. Waypoints	Page 51
TABLES	
Table 1. Birds recorded on three farms in northern and Central Saudi Arabia	Page 14
Table 2. Details of half hour walked morning census sites - northern and central Saudi Arabia	Page 20
Table 3. Details of driven transect count sites - northern Saudi Arabia	Page 24
Table 4. Walked morning censuses - northern Saudi Arabia: Potential breeding birds recorded	Page 26
Table 5. Walked morning censuses - northern Saudi Arabia: Non breeding birds recorded	Page 27
Table 6. Walked morning censuses - northern Saudi Arabia: Population extrapolations of selected resident plains species	Page 28
Table 7. Driven transect counts - northern Saudi Arabia: Species recorded	Page 30
Table 8. Driven transect counts - northern Saudi Arabia: Population extrapolations of selected plains species	Page 31
Table 9. Northern Saudi Arabia - Comparison population calculations of selected plains breeding species by census method	Page 32
Table 10. Estimated bird populations along the Al Hair watercourse January 2009 and April 1999	Page 34
Table 11. Number of species and individual birds recorded during walked morning censuses in 2009 compared to previous censuses nearby	Page 36
Table 12: Suggested population levels of five common resident bird species on the plains of northern Saudi Arabia, February 2009	Page 37
Table 13: Observation of some key wintering species in northern Arabia during previous ABBA Surveys in February and March	Page 40

FIGURES

Fig 1. ABBA Survey 40: Northern Saudi Arabia (February 2009) - Places visited and campsites	Page 8
Fig 2. Walked census sites	Page 9
Fig 3. Distribution of Driven Transect Counts	Page 10

PLATES

Plates 1-21. The walked census site habitats	Page 16
Plate 22. A shallow wadi in northern Saudi Arabia after good rains (April 1992, ABBA Square GB40)	Page 38

INTRODUCTION

1. The authors visited the plains of northern Saudi Arabia in February 2009, a contiguous area of over 231,000 km², which is approximately the size of the United Kingdom.
2. The Atlas of the Breeding Birds of Arabia (ABBA) project has since 1984 sought to determine the distribution and status of birds breeding in the Arabian peninsula. This uses a half degree grid square system, the atlas squares are identified at Fig. 1 and referred to at times within this report. The final manuscript of the atlas was submitted for publication in *Fauna of Arabia* in March 2009 however the programme to collect information on Arabian birds will proceed indefinitely.
3. On previous winter and early spring ABBA Surveys to northern Saudi Arabia; Survey 5, February - March 1988 (Jennings, al Toum & al Issa, 1988) and Survey 14, February 1993 (Jennings et al, 1996), surprisingly large numbers of some wintering species were found on the plains. These included Eurasian Dotterel *Charadrius morinellus* in groups of up to 125, Black-bellied Sandgrouse *Pterocles orientalis* a rare winter visitor to Arabia was found in groups of a dozen or more and Pin-tailed Sandgrouse *Pterocles alchata* sometimes with daily counts of over 1,000. Once a group of 45 of the endangered Sociable plover *Vanellus gregarius*, were seen in early March. In addition numerous eagles, vultures and other birds of prey are known to winter in the area as are several passerine species notably wheatears *Oenanthe* sp and many larks. The primary aim of the survey was to assess the numbers of birds wintering in the area and suggest the population levels of resident species by a variety of census techniques. A secondary aim was to collect information on breeding bird distribution in the region.
4. During the period 1-25 February the survey team visited the northernmost part of Saudi Arabia from the Gulf of Aqaba in the west to the northern coast of the Arabian Gulf in the east, generally north of the Nefud Kebir and Ad Dahna sand-seas and in other places generally north of 27°N. The Nefud Kebir was accessed from a highway that crosses that sandsea. Other places visited included Jebal Selma south of Hail (26 February), the al Hair watercourse (30 January), Riyadh (31 January) and Todhia farm east of Al Kharg (27 February). The places visited and camp sites of the survey can be seen at Fig. 1. Campsites

were the start of walked censuses, see distribution at Fig. 2. There is a gazetteer at Appendix 1. The main survey area, the north Arabian plain defined at Fig. 3, is where all driven transects counts were made. This region is mostly within 200 km of the northern Saudi Arabia border with Jordan, Iraq and Kuwait, north of the sand seas. A limited number of observations were made in central Arabia near Riyadh by the first author on 30 and 31 January and 26-28 February.

REGIONS VISITED

5. Northern Saudi Arabia exhibits a variety of topography; plains, limestone ridges and more significant sandstone outcrops, sand seas and volcanic harrat areas. All these landforms were visited, although only the edge of the harrats were touched on the north-east of the Harrat al Harrah. The main named regions visited are described below, these regions do not make up the whole area of the survey and some parts were covered less well due to a number of circumstances outside the control of the team, notably border region restrictions of movement and sandstorms. Some special sites and large irrigated farms within the study area were visited and these and sites south of the main study area are also described.

Plains Habitats

6 Northern Saudi Arabia has probably been important as a grazing area for millennia, it has very few towns and most of these have been established in the latter part of the 20th Century. It is still important for the grazing of flocks of sheep and camels although in many areas irrigated farmlands some utilising desalinated water (in the east) and deep boreholes to fossil aquifers (in the west) were established in the late 20th Century.

Ad Dibdibah

7. Ad Dibdibah is a generally very flat area lying at about 320-450 m elevation, with occasional small limestone hillocks. It has a hard gravelly surface with local areas of soft sand, it stretches from north-eastern Saudi Arabia to parts of Kuwait (mainly ABBA squares MA33 to NA35). It is an area of low vegetation of herbs and grasses (no trees) and is important for grazing of sheep and camels but grazing quality from year to year, like most parts of Arabia is dependent on rainfall. The region has a number of drainage depressions where water collects after rain and at such basins sometimes a thick growth of *Zizyphus spina-cristi* bushes occurs. A habitat attracting a variety of species not found on the open plains. (These thickets are the only significant natural vegetation found in northern and north-eastern Arabia.) In the past the Dibdibah has been the site where the most records of Dotterel have been reported. In view of the historical importance of this region to the species and its declining population in eastern Europe and Asia an assessment of the total numbers wintering in the region was a main objective of the survey. Large numbers of several species of larks (Alaudidae) breed, several of a nomadic habit and the region can also hold very high numbers of wintering larks.

As Summan

8. This region is south of Ad Dibdibah and is more undulating with chalky hills and ridges (often flat topped) with occasional *Zizyphus* basins and thickets of the broom *Leptadenia pyrotechnica* and bushy *Lycium shawii*. There are no trees. The surface is gravelly and sandy like Ad Dibdibah. Elevation is about 250-300 m, and mainly extends over ABBA squares LB32 to NB30. It is another important grazing area, notably for camels. Like Ad Dibdibah,

As Summan holds numerous larks species both as breeding birds and winter visitors but the rocky outcrops allow for a greater resident species diversity than is found on Ad Dibdibah, e.g. breeding owls and raptors. Like Ad Dibdibah this region showed evidence of some recent rain in February 2009 but the state of the vegetation suggested rainfall had been poor in recent years.

Al Hajarah

9. This region lies to the north-west of Ad Dibdibah, mainly from ABBA squares JB35 to LA33. It is very flat with a rocky (limestone) surface with here and there shallow rock rimmed silty depressions which collect water after rain and which can hold a sparse vegetation of grasses and herbs, with lichens on rocks. There are no trees. Elevation is about 420-500 m. It is an important grazing area, especially the depressions, after rains. There was one short sharp downpour during the survey but the region showed evidence of generally poor rainfall over recent years.

Al Bisaita

10. Al Bisaita is an extremely flat and monotonous habitat almost devoid of vegetation except in sahels (very shallow wadis) where the little rain that falls collects to allow a flush of ephemerals in the following weeks and some perennial plants to grow and flower for a few years. Elevation is about 630-680 m, it is mainly in ABBA squares from DB37 to EA36. A small group of acacia trees, the only indigenous trees seen in the whole north Arabian plain, were found in a sahel in this region. It is an area that was traditionally avoided by graziers and bedouin on account of its aridity but in the last two decades the region has been found very suitable for agriculture by central pivot irrigation and a number of large farms have been established. One such farm, NADEC farm, was visited. The condition of vegetation suggested that there has been no rainfall in this region in recent years.

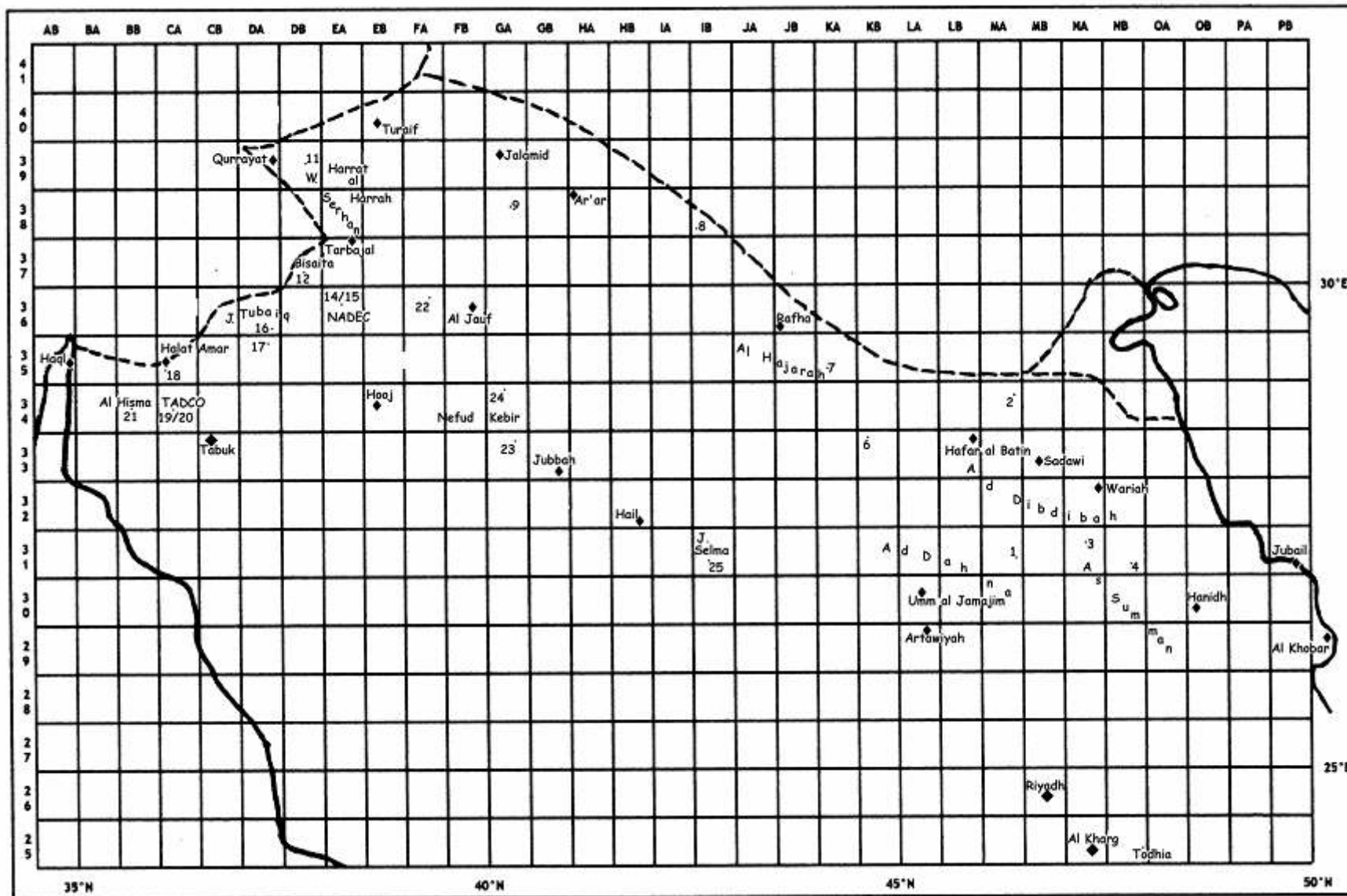
Jebals and areas of Rock Outcrops

11. In the central northern district the volcanic Harrat al Harrat region (not visited) which has peaks of up to 1,123 m is the only part of the north Arabian plain with significant broken topography and a rocky aspect. West of Al Bisaita the ground becomes increasingly mountainous.

Jebal Tubaiq

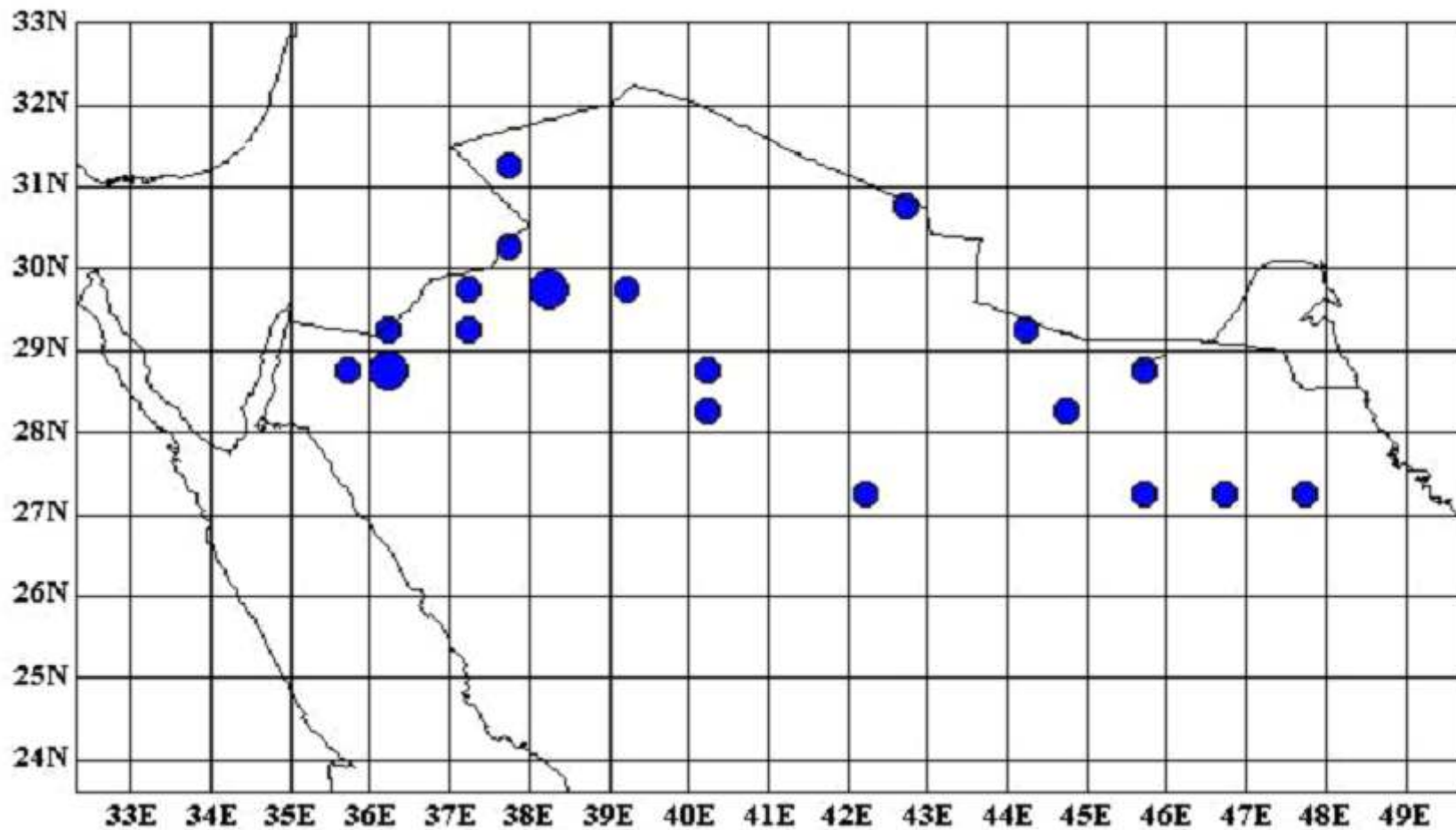
12. The Jebal Tubaiq is an extensive area of sandstone outcrops in north-western Saudi Arabia between Tabuk and Al Bisaita. The majority lies in ABBA squares CB35 to DA36. The region is at 800-1,200 m (up to 300 m above the surrounding area). An NCWCD protected area is established in this region to secure a population of ibex *Capra ibex*. The region holds important populations of typical Arabian birds of rocky arid regions and breeding species known or likely include Golden Eagle *Aquila chrysaetos*, Lappet-faced Vulture *Torgos tracheliotos*, Eurasian Griffon *Gyps fulvus*, Egyptian Vulture *Neophron percnopterus* and is also important for wintering species such as Cinereous Vulture *Aegypius monachus*. The jebal is cut by wadis holding acacia, *Zizyphus* and various shrubs and ephemeral vegetation after rains. Although some rain was reported about three months before the survey the region has suffered from a long term drought resulting in low populations of resident and wintering birds and it was suggested by the NCWCD rangers that some of the ibex population had left the area.

Fig. 1. ABBA SURVEY 40: NORTHERN SAUDI ARABIA (FEBRUARY 2009) - PLACES VISITED AND CAMPSITES



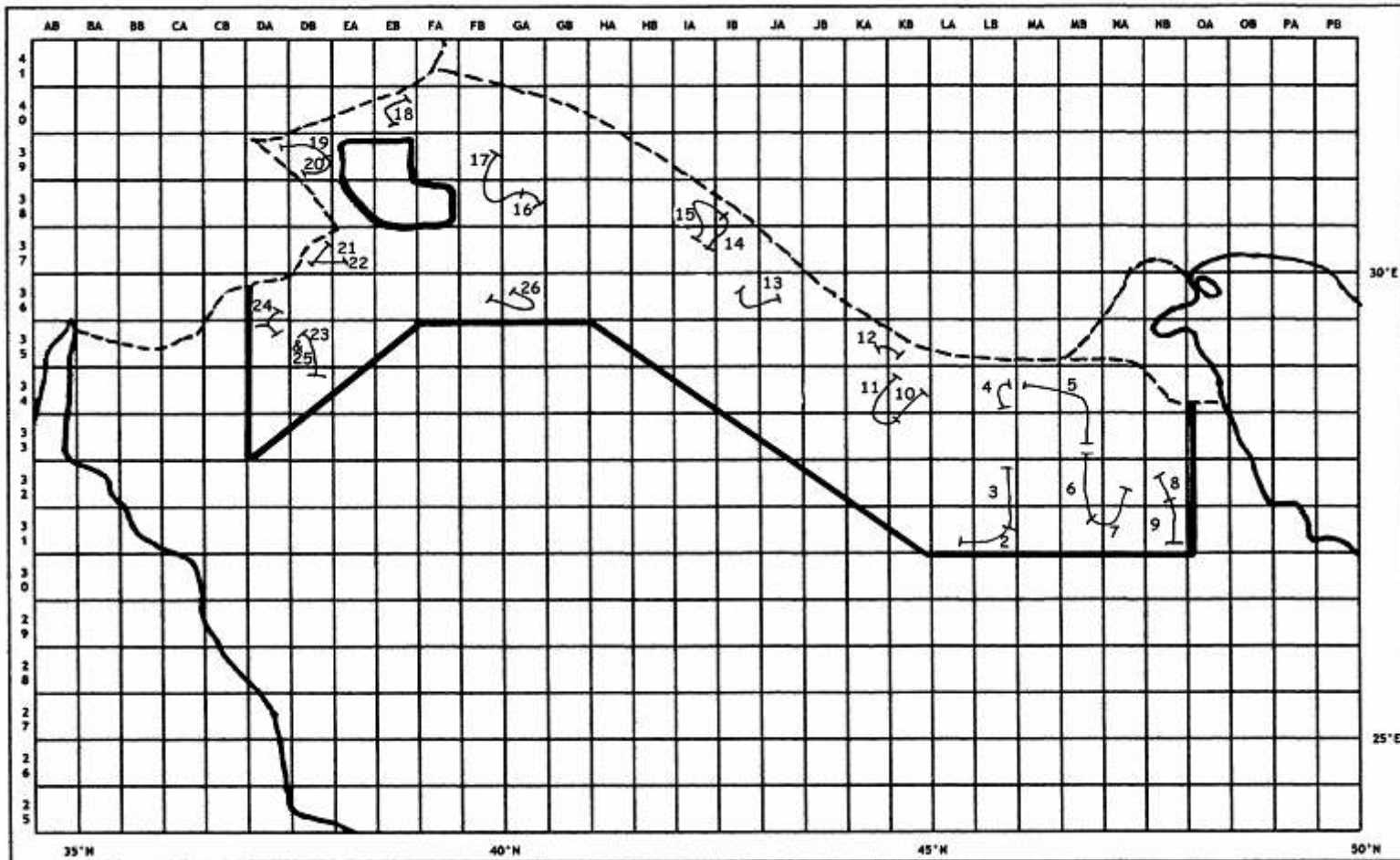
The numbers are dates in February and the location of campsites. Hotel accommodation was taken at Al Khobar (5th), Turaif (10th) and Qurrayat (13th)

Fig. 2. ABBA SURVEY 40 - NORTHERN SAUDI ARABIA (FEBRUARY 2009) - WALKED CENSUS SITES



Each square is a full degree square, i.e. four half degree ABBA Squares (see Fig. 1.). Large dots are those ABBA Squares where two walked censuses were carried out.

Fig. 3. ABBA SURVEY 40: NORTHERN SAUDI ARABIA (FEBRUARY 2009) - DISTRIBUTION OF DRIVEN TRANSECT COUNTS



The area between the border and the bold line (excluding the Harrat al Harrah) is the northern plain of Saudi Arabia, with an estimated area of 231407 km².

Al Hisma

13. Al Hisma is an extensive mountainous region of north-west Saudi Arabia, between Tabuk and the Gulf of Aqaba. It is an area of huge sandstone buttes with sheer cliff sides which are cut by wide sandy canyons. The elevation is mostly 1,000 - 1,200 m. The canyons hold xerophytic plants, *Retama raetam* is common. The whole region appeared very dry during the survey with no ephemerals to indicate recent rain. There are a few acacia trees. Being part of the mountain chain of western Arabia a number of birds restricted to those mountains occur in Al Hisma and nowhere else in northern Arabia.

Sandseas

14. Small isolated sand dunes are scattered over the majority of the plains of northern Arabia however on the southern border of the main study area there is an unbroken stretch of large dunes.

Ad Dahna

15. Ad Dahna is a remarkably long, probably at least 1,000 km., narrow strip of sand dunes linking the eastern part of the Nefud Kebir with the northern part of the Rub al Khali. Only a small part of Ad Dahna was visited on 1 February.

Nefud Kebir

16. This is a contiguous area of about 100,000 sq km of rolling sand dunes, in many places there are stable features of crescentic hollows and high ridges. Elevation is mostly about 800-900 m. The only settlement within this region is at Jubbah towards the southern side, where there is an outcrop of sandstone and some small areas of crops. The vegetation is more or less the same throughout with woody bushes of *Haloxylon* and xerophytic shrubs. A few patches of ephemeral plants indicated some recent rain in February 2009. Very few bird species are resident but these include some larks. Long-legged Buzzard, *Buteo rufinus* and Desert Eagle Owl *Bubo ascalaphus* are the main resident predators. Species requiring a rocky habitat are totally absent (except at Jubbah). During the early 21st Century a highway was constructed through the centre of this sand-sea and in February 2009 a railway was under construction running parallel to the road. A few commensal species occurred along these routes at human sites.

Farms in Northern Arabia

17. Large irrigated farms are, since the late 20th Century, a new habitat in northern Arabia. The majority of crops are cereals (wheat and barley) but large areas are under fruit production and olive groves are becoming increasingly common. The farms present enormous concentrations of commensal species at places where often these same species were unknown previously. They are also habitat islands which are perhaps representative of more northern regions and as a result they have attracted in a number of northern and Mediterranean species to breed for the first time in Arabia. The farms are attractive to many species in winter.

NADEC Farm (Al Bisaita)

18. NADEC farm on Al Bisaita plain (ABBA Square EA36) which has a total area of about 9,600 ha. is a typical example of what can happen in terms of bird diversity if a barren gravel plain, devoid of vegetation is fenced and irrigated for a decade with new habitats of crops, weedy ungrazed waste ground, trees planted and fruit orchards, created. This farm was previously visited during April 1999 (ABBA

Survey 25; Jennings, 1999), a comparative list of the birds observed on both visits is at Table 1. (NB This farm is actually named 'NADEC Wadi Serhan', which is slightly misleading as Wadi Serhan is another significant region to the north east of Al Bisaita).

TADCO Farm

19. TADCO farm is to the north of Tabuk (ABBA Squares CA34, CA33) and is similar to NADEC farm but larger at 35,000 ha. The total farm area includes a significant area of sandstone outcrops and uncultivated sections and thus originally had a more diverse indigenous avifauna than NADEC farm. These extra habitats also allow more species to breed. This farm was previously visited during April 1999 (ABBA Survey 25; Jennings, 1999), a comparative list of the birds observed on both visits is at Table 1. Both NADEC and TADCO produce honey from many hives but neither farm have any livestock.

Other Sites Visited in Northern and Central Arabia

20. **Al Jauf lake** (ABBA Square FB36). An artificial freshwater lake (reservoir) north of Al Jauf (Dawmat al Jandal), it includes small reedbeds, tamarisk scrub and sandy shores. Much of it is disturbed by recreation and other parts are evidently frequented by hunters with shot guns. It is an important refuge for wintering and migrant waterbird species.

21. **Jebal Selma** (ABBA Square IA31). With a base at about 1,000 m this jebal lies to the south-east of Hail, it is an isolated largely granite mountain with at least one large inactive volcano crater and associated basalt covered hillsides. It has many acacia rich wadis, a few date palms and a range of bushes and other perennial vegetation. A number of bird species are found here at the northernmost end of their central Arabia range. Unlike all the other places visited in northern Arabia there had been good rains in the region of this jebal a few weeks earlier and many ephemeral plants were visible.

22. **Al Hair watercourse** (ABBA Square MB26, MB25). This lies south of Riyadh and is a long established artificial perennial stream of waste water with fringing vegetation and a rich variety of breeding birds, several fish species and invertebrates. A number of bird species breed along this watercourse which are generally rare or absent elsewhere in Arabia.

23. **Todhia Farm** (ABBA Square NB25). This is a small cereal farm (approx 2,000 ha) to the east of Al Kharg, it has established trees (tamarisks planted as wind breaks) and ungrazed shallow wadis. It is typical of many areas in central Arabia and holds a number of bird species that have colonised agricultural areas in this district since the late 20th Century. This farm was previously visited during April 1999 (ABBA Survey 25; Jennings, 1995b) and March 2003 (ABBA Survey 32; Jennings, 2004). A comparative list of the birds observed on these three visits is at Table 1.

METHODS

24. During the period 30 January to 28 February observations were recorded of birds in central and northern Arabia. The main survey period 1-26 February was spent almost entirely on the plains of northern Saudi Arabia but before and after that period sites were visited in the Riyadh area and casual observations made within Riyadh city.

25. On 30 January a 4.5 km (3.8 km direct line by GPS) walked transect was completed along the Al Hair watercourse from Al Hair bridge upstream to the main dam and some species densities were estimated from observations. On 27 February Todhia farm was visited. The observation details of these

excursion are included in the systematic list at Appendix 2 but are generally not detailed in this report.

26. During the main survey period observations were gathered continually by the observers and recorded on a daily basis for each species, by sites and by ABBA squares using the standard ABBA reporting formats. However two structured censusing formats were used to a considerable extent.

Half-hour walked Early Morning Transect Census

27. At dawn at all but one of the campsites a half-hour walked transect census were carried out following a format developed over previous ABBA surveys. No censuses were made on the few mornings which started at hotels but censuses were carried out each day at farms. During each census all birds seen or heard were counted, breeding activity was recorded and notes made of each site including the superficial geology, vegetation, habitats, land usage etc. In all some 21 walked morning censuses were made. The date, location, habitat and elevation details of each census site is at Table 2. These censuses are always made as close to dawn as possible as experience has shown that this is the time of day that most birds are visible or audible, as they actively feed after the nights fast and sing. When the sun has been up for only two hours bird observation becomes more difficult as individual bird move to shady places and generally reduce their activities. The distribution of the walked morning census sites is shown at Fig. 2. Plates 1-21 show the actual census habitats.

28. The results of these morning censuses provide a snapshot of birds present (including non-breeding species) on the day but do not necessarily represent the birds that might occur at other times of the year or from year to year. The full value of this type of transects census in assessing bird populations, their habitats and other ecological requirements, is only achieved after many censuses over the same or similar sites, preferably at different times of the year. This is clearly not possible given the total area of the present survey but even so the walked morning censuses results, when taken together, can provide a yardstick on which rough order population estimates can be based. The results can also be compared to similar census work in the region in other years and can be measured against the results of the driven transect count methods, see below.

29. Walked morning census sites on the plains were all from the camp sites of the previous day. Because camp sites were chosen rather than random the nearby habitats were often, but not always, very slightly different from the generality of the surrounding area, for example beside a slight hollow or ridge or with slightly more vegetation. This slight difference may be the source of a bias between the results of walked morning censuses and driven transects counts.

Driven Transect Counts

30. Northern Saudi Arabia is for the most part an open plain with a hard surface most of which is easily accessible to four-wheel drive vehicles. The long distances and small populations of birds make extended censusing on foot time consuming and inefficient but the topography lends itself well to driven transects and such survey methods are perhaps the only way that bird populations over large desert areas can be sampled during a survey of this nature. Driven transect counts were used extensively. There were always two observers in the survey vehicle, including the first author. During transects all birds seen by both observers were recorded. Clearly there will be many reasons why the results will not be fully representative of the actual bird populations in the areas traversed but such driven transects provide an indication of the minimum number of birds, present in any one area and these minima can be extrapolated to wider areas.

Table 1: ABBA SURVEY 40: FEBRUARY 2009

BIRDS RECORDED ON THREE FARMS IN NORTHERN AND CENTRAL SAUDI ARABIA

With detail of species seen at the same farms in April 1999 and March 2003.

English Name	Scientific name	Status (See notes below)	TADCO Farm nr Tabuk NADEC Farm, Bisaita northern Saudi Arabia (ca EA36)					
			Todhia Farm west of Al Kharg central Arabia (ca NB25)	Mar 2003	Feb 2009	Apr 1999	Feb 2009	Apr 1999
Common Quail	<i>Coturnix coturnix</i>	BR/PM	✓	✓		✓		✓
Mallard	<i>Anas platyrhynchos</i>	BR/WV	✓					
Squacco Heron	<i>Ardeola ralloides</i>	PM				✓		✓
Cattle Egret	<i>Bubulcus ibis</i>	PM			✓			✓
Grey Heron	<i>Ardea cinerea</i>	PM	✓					
Common Kestrel	<i>Falco tinnunculus</i>	BR/WV	✓	✓	✓	✓	✓	✓
Black Kite	<i>Milvus migrans</i>	PM/WV				✓	✓	✓
Egyptian Vulture	<i>Neophron percnopterus</i>	BR/PM				✓		
Marsh Harrier	<i>Circus aeruginosus</i>	PM/WV		✓		✓		✓
Hen Harrier	<i>Circus cyaneus</i>	WV					✓	
Pallid Harrier	<i>Circus macrourus</i>	PM		✓				✓
Montagu's Harrier	<i>Circus pygargus</i>	PM			✓	✓		✓
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	WV				✓		✓
Eurasian Buzzard	<i>Buteo buteo</i>	PM/WV				✓	✓	✓
Long-legged Buzzard	<i>Buteo rufinus</i>	BR/WV			✓		✓	✓
Eastern Imperial Eagle	<i>Aquila heliaca</i>	WV			✓	✓		✓
Booted Eagle	<i>Hieraaetus pennatus</i>	PM				✓		
Eurasian Stone Curlew	<i>Burhinus oedipnemus</i>	BR/PM						✓
Black-winged Stilt	<i>Himantopus himantopus</i>	BR/PM	✓					
Spur-winged Lapwing	<i>Vanellus spinosus</i>	BR	✓		✓	✓	✓	
Kentish Plover	<i>Charadrius alexandrinus</i>	BR/PM		✓				
Common Snipe	<i>Gallinago gallinago</i>	PM/WV				✓		
Greenshank	<i>Tringa nebularia</i>	PM						✓
Green Sandpiper	<i>Tringa ochropus</i>	PM/WV						✓
Wood Sandpiper	<i>Tringa glareola</i>	PM						✓
Common Sandpiper	<i>Actitis hypoleucos</i>	PM/WV				✓		✓
Little Stint	<i>Calidris minuta</i>	PM/WV	✓	✓				✓
Ruff	<i>Phlomachus pugnax</i>	PM	✓	✓				
Cream-coloured Courser	<i>Cursorius cursor</i>	BR/WV		✓		✓	✓	✓
Pin-tailed Sandgrouse	<i>Pterocles alchata</i>	BR/WV				✓	✓	
Rock Dove	<i>Columba livia</i>	BR	✓	✓	✓	✓	✓	✓
European Turtle Dove	<i>Streptopelia turtur</i>	PM/BS		✓		✓		✓
Eurasian Collared Dove	<i>Streptopelia decaocto</i>	BR	✓	✓	✓	✓	✓	✓
Laughing Dove	<i>Streptopelia senegalensis</i>	BR	✓	✓	✓	✓	✓	✓
Namaqua Dove	<i>Oena capensis</i>	BR	✓	✓		✓	✓	✓
Common Cuckoo	<i>Cuculus canorus</i>	PM				✓		✓
Barn Owl	<i>Tyto alba</i>	BR						✓
Desert Eagle-Owl	<i>Bubo ascalaphus</i>	BR			✓		✓	
Common Swift	<i>Apus apus</i>	PM				✓		
Pallid Swift	<i>Apus pallidus</i>	BS	✓	✓				
European Roller	<i>Coracias garrulus</i>	PM				✓		
Green Bee-eater	<i>Merops orientalis</i>	BR	✓	✓	✓			
Blue-cheeked Bee-eater	<i>Merops superciliosus</i>	PM/BS		✓				
European Bee-eater	<i>Merops apiaster</i>	PM	✓	✓		✓		✓
Hoopoe	<i>Upupa epops</i>	BR/PM		✓	✓	✓		✓
Red-backed Shrike	<i>Lanius collurio</i>	PM						✓
Isabelline Shrike	<i>Lanius isabellinus</i>	PM	✓	✓	✓			✓
Lesser Grey Shrike	<i>Lanius minor</i>	PM						✓
Southern Grey Shrike	<i>Lanius meridionalis</i>	BR	✓	✓	✓			✓
Woodchat Shrike	<i>Lanius senator</i>	PM				✓		
Masked Shrike	<i>Lanius nubicus</i>	PM				✓		
Golden Oriole	<i>Oriolus oriolus</i>	BR/PM	✓					
Brown-necked Raven	<i>Corvus ruficollis</i>	BR	✓	✓		✓	✓	✓
Sand Martin	<i>Riparia riparia</i>	PM		✓		✓		✓
Barn Swallow	<i>Hirundo rustica</i>	PM		✓		✓	✓	✓
Pale Crag Martin	<i>Ptyonoprogne obsoleta</i>	BR	✓			✓	✓	
Greater Hoopoe-Lark	<i>Alaemon alaudipes</i>	BR		✓	✓	✓	✓	✓
Bar-tailed Lark	<i>Ammomanes cinctura</i>	BR	✓	✓		✓	✓	✓

English Name	Scientific name	Status (See notes below)	Apr 1999	Mar 2003	Feb 2009	Apr 1999	Feb 2009	Apr 1999	Feb 2009
Desert Lark	<i>Ammomanes deserti</i>	BR	✓	✓	✓	✓		✓	
Greater Short-toed Lark	<i>Calandrella cinerea</i>	BR	✓	✓	✓	✓	✓	✓	✓
Lesser Short-toed Lark	<i>Calandrella rufescens</i>	WV						✓	
Crested Lark	<i>Galerida cristata</i>	BR	✓	✓	✓	✓	✓	✓	✓
Black-crowned Sparrow-Lark	<i>Eremopterix nigriceps</i>	BS	✓	✓					
Temminck's Lark	<i>Eremophila bilopha</i>	BR						✓	
Scrub Warbler	<i>Scotocerca inquieta</i>	BR						✓	
Graceful Prinia	<i>Prinia gracilis</i>	BR				✓			
White-cheeked Bulbul	<i>Pycnonotus leucogenys</i>	BR		✓	✓				
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	PM				✓			
Eurasian Reed Warbler	<i>Acrocephalus scirpaceus</i>	PM/BS				✓			
Olivaceous Warbler	<i>Hippolais pallida</i>	PM/BS				✓			
Willow Warbler	<i>Phylloscopus trochilus</i>	PM				✓		✓	
Chiffchaff	<i>Phylloscopus collybita</i>	PM		✓			✓		✓
Blackcap	<i>Sylvia atricapilla</i>	PM				✓		✓	
Garden Warbler	<i>Sylvia borin</i>	PM						✓	
Lesser Whitethroat	<i>Sylvia curruca</i>	WV	✓	✓		✓		✓	
Desert Warbler	<i>Sylvia nana</i>	WV		✓				✓	
Greater Whitethroat	<i>Sylvia communis</i>	PM				✓		✓	
Ménétries's Warbler	<i>Sylvia mystacea</i>	WV			✓				
Blackbird	<i>Turdus merula</i>	WV							✓
Song Thrush	<i>Turdus philomelos</i>	WV							✓
Bluthroat	<i>Luscinia svecica</i>	WV					✓		✓
Nightingale	<i>Luscinia megarhynchos</i>	PM				✓			
White-throated Robin	<i>Irania gutturalis</i>	PM						✓	
Rufous-tailed Scrub Robin	<i>Cercotrichas galactotes</i>	BS		✓		✓		✓	
Black Scrub Robin	<i>Cercotrichas podobe</i>	BR		✓	✓				
Black Redstart	<i>Phoenicurus ochruros</i>	WV		✓	✓		✓		✓
Common Redstart	<i>Phoenicurus phoenicurus</i>	PM				✓		✓	
Common Stonechat	<i>Saxicola torquata</i>	WV					✓		✓
Whinchat	<i>Saxicola rubetra</i>	PM						✓	
Isabelline Wheatear	<i>Oenanthe isabellina</i>	PM/WV	✓	✓	✓		✓		✓
Northern Wheatear	<i>Oenanthe oenanthe</i>	PM		✓		✓		✓	
Pied Wheatear	<i>Oenanthe pleschanka</i>	PM	✓	✓	✓		✓		
Black-eared Wheatear	<i>Oenanthe hispanica</i>	PM				✓			
Desert Wheatear	<i>Oenanthe deserti</i>	WV	✓	✓		✓	✓		✓
Finsch's Wheatear	<i>Oenanthe finschii</i>	WV							✓
Mourning Wheatear	<i>Oenanthe lugens</i>	BR					✓	✓	
White-crowned Wheatear	<i>Oenanthe leucopyga</i>	BR				✓	✓		
Common Rock Thrush	<i>Monticola saxatilis</i>	PM		✓		✓			
Blue Rock Thrush	<i>Monticola solitarius</i>	PM			✓		✓		
Spotted Flycatcher	<i>Muscicapa striata</i>	PM						✓	
House Sparrow	<i>Passer domesticus</i>	BR	✓	✓	✓	✓	✓	✓	✓
Spanish Sparrow	<i>Passer hispaniolensis</i>	BR		✓		✓	✓	✓	✓
Pale Rockfinch	<i>Carpodacus brachydactyla</i>	PM/BS		✓					
Yellow Wagtail	<i>Motacilla flava</i>	PM		✓	✓	✓		✓	
White Wagtail	<i>Motacilla alba</i>	WV		✓	✓	✓	✓	✓	✓
Tawny Pipit	<i>Anthus campestris</i>	WV		✓	✓	✓		✓	
Tree Pipit	<i>Anthus trivialis</i>	PM		✓				✓	
Red-throated Pipit	<i>Anthus cervinus</i>	PM		✓		✓	✓	✓	
Eurasian Goldfinch	<i>Carduelis carduelis</i>	BR				✓	✓	✓	
Eurasian Linnet	<i>Carduelis cannabina</i>	WV					✓		
Trumpeter Finch	<i>Bucanetes githaginea</i>	BR				✓			
Desert Finch	<i>Rhodospiza obsoleta</i>	BR		✓		✓	✓	✓	✓
Corn Bunting	<i>Emberiza calandra</i>	BR/WV		✓			✓		
Ortolan Bunting	<i>Emberiza hortulana</i>	PM		✓		✓		✓	
			30	53	29	62	40	59	33

Status in Saudi Arabia

General status in Saudi Arabia is provided. Comment is made if this is different at individual sites. Some species have dual status, e.g. one population winters and another is a breeding resident.

BR Breeding resident.

BS Breeding as a summer visitor.

PM Passage migrant through Arabia. (A small number may also be present as winter visitors).

WV Winter visitor to Arabia. (A small number will also be migrants through Arabia).

Plates 1-21. Census sites 1-21.



Census 1: SW Ad Dibdibah (LB31)

Census 3: SE Ad Dibdibah/NW As Summan (MB31)

Census 5: SW of Hafar al Batin (KB33)

Census 2: NW Ad Dibdibah (LB34)

Census 4: N As Summan (NB31)

Census 6: E of Rafha (KA35)



Census 7: Iraq border (IB38)

Census 9: Al Bisaita plain (DB37)

Census 11: NADEC farm al Bisaita (EA36)

Census 8: NW Harrat al Harrah (DB39)

Census 10: NADEC farm al Bisaita (EA36)

Census 12: NE Jebal Tubaiq plateau (DA36)



Census 13: Wadi al Azrat, Jebal Tubaiq (DA35)
 Census 15: TADCO farm N of Tabuk (CA34)
 Census 17: Al Hisma (BB34)

Census 14: Jordan border near Halat Amar (CA35)
 Census 16: TADCO farm sandstone outcrop (CA34)
 Census 18: W of Al Jauf (FA36)



Census 19: Nefud Kebir (GA33)
Census 21: SE Jebal Selma (IA31)

Census 20: Nefud Kebir (GA34)

Table 2: ABBA SURVEY 40: FEBRUARY 2009

DETAILS OF HALF HOUR WALKED MORNING CENSUS SITES - NORTHERN SAUDI ARABIA

No.	Date	ABBA Sq	Coordinates of start point	Alt. (M)	Location/Habitat (Notes 1)
1	2/2/09	LB31	27°16.449'N 45°44.309'E	445	SW Dibdibah, 100 km S of Hafar al Batin. Hard stony surface with small hillocks (1-3m) of underlying limestone and sandy patches. Bedu in area with sheep and camels.
2	3/2/09	LB34	28°53.921'N 45°52.504'E	339	NW Dibdibah, 40k N of Hafar al Batin. Flat hard gravel and sandy surface. Patches of ground vegetation, herbs grasses and dandelions.
3	4/2/09	MB31	27°21.419'N 46°51.035'E	325	SE Dibdibah/NW Summan. Sandy plains with outcrops of chalky limestone with plateau tops up to 30-40 m. Recent good rains and many ephemeral plants but woody plants such as <i>Leptadenia</i> and <i>Lycium</i> were sometimes dead.
4	5/2/09	NB31	27°06.082'N 47°39.001'E	279	Northern Summan. Low sandy undulations with chalky outcrops with flat tops up to 10m. Lots of ephemeral vegetation after recent rains. Many bedu camps in the area.
5	7/2/09	KB33	28°29.748'N 44°34.567'E	470	SW of Hafar al Batin. Rocky limestone plain with depression pans. No vegetation on rocky surface, pans with many ground hugging plants. Recent rains and rain yesterday. Sheep flocks in area.
6	8/2/09	KA35	29°12.478'N 44°10.107'E	422	Bare rock strewn plain (limestone) with two silt pans, one of which had 150 m of low ephemeral vegetation in an old vehicle track. No other significant vegetation but lichen growths on ground and rocks.
7	9/2/09	IB38	30°32.980'N 42°30.262'E	356	Nr Iraq border. Sandy drifts on side of gravel outcrops, with lifeless Rimth bushes and little other vegetation.
8	12/2/09	DB39	31°15.202'N 37°43.931'E	512	NW edge of Harrat al Harrah. A shallow depression with Harrat on one side and limestone bluffs on the other. Recent rain but no ephemerals. Main vegetation was <i>Raetama retam</i> and <i>Hamada elegans</i> and 1 tamarisk.
9	13/2/09	DB37	30°06.700'N 37°49.337'E	674	Bisaita plain. A sahel (shallow wadi) with much vegetation over a width of about 30 m) which was dry/dead due to no recent rain. No ephemerals and no flocks in the area.
10	15/2/09	EA36	29°53.303'N 38°18.486'E	624	NADEC Farm, Bisaita. Groves of apricot and peach trees of varying age from just planted to 12 years or more. Orchards separately by roads/tracks lined with olive and eucalyptus trees. All trees individually irrigated. Many beehives.
11	16/2/09	EA36	29°51.991'N 38°18.576'E	631	NADEC Farm Bisaita. Olives grove with trees about 10 years. Patches of green ephemeral vegetation and weeds at base of each tree from drip of irrigation systems.
12	17/2/09	DA36	29°30.546'N 37°27.827'E	1092	Jebal Tubaiq. Sandstone plateau, only dry vegetation, no rain in recent past.
13	18/2/09	DA35	29°22.806'N 37°21.802'E	989	SW Jebal Tubaiq (Wadi as Asrat). Sandy wadi with many acacias. Very dry and no recent rain.
14	19/2/09	CA35	29°05.114'N 36°08.716'E	758	Sandstone outcrop S of Halat Amar (Jordan border). Very dry and no green vegetation, just a few dry halophytes. The birds seen probably depend on the small farm about 2 km distance.
15	20/2/09	CA34	28°44.725'N 36°17.736'E	759	TADCO Farm N of Tabuk. Fruit orchards of peach and apricot, in varying conditions some watered, some dry, some in blossom, some not, some mulched with straw.
16	21/2/09	CA34	28°43.376'N 36°14.127'E	768	TADCO Farm N of Tabuk. Sandstone outcrop surrounded by irrigated pivot fields mainly of wheat (mostly about 1km or more distance), and fruit orchards about 2 km way. No vegetation.
17	2/22/09	BB34	28°49.862'N 35°33.372'E	1130	Al Hisma. Sandstone canyons with wide sandy bottoms filled with halophytes and <i>Raetama</i> . No recent rain and very dry, no ephemerals. Some recent grazing but no flocks seen.

No.	Date	ABBA Sq	Coordinates of start point	Alt. (M)	Location/Habitat (Notes 1)
18	23/2/09	FA36	29°52.695'N 39°27.626'E	695	W of Al Jauf. Rocky (sandstone) outcrop with rocky wadi. A few dry halophytes, no ephemerals or flocks. Irrigation pivots about 1.3 km away.
19	24/2/09	GA33	28°29.226'N 40°28.900'E	865	Nefud Kebir. Dunes, hollows with much vegetation but it was mostly dead or very dry. However a few green shoots. A little rain the previous night and during the census.
20	25/2/09	GA34	28°57.950'N 40°11.778'E	841	Nefud Kebir. Undulating dunes and shallow hollows. Haloxylon mounds with a few dead/dry herbs grasses and rush. No ephemerals, no flocks, a little recent rain.
21	26/2/09	IA31	27°05.700'N 42°09.653'E	1078	E Jebal Selma. Rocky wadi with boulders, few date palms and acacia. Good rains about a month ago as many ephemerals.

Notes

Further details of these sites, such as weather at the time, superficial geology/topography, vegetation, land usage and other birds seen at the census site but not during the census are contained in the ABBA files.

31. This censusing method was not used in the western part of the survey area (west of Jebal Tubaiq) as the topography there did not easily lend itself to long distance off-road travel and neither did it have a homogeneous habitat. No driven transect counts were done on asphalt roads. On some days conditions were not suitable for this type of transect count, for example high winds or dust storms would have presented biases. The average speed of these transects was about 15-35 kph although one transect averaged 11 kph and another 45 kph. The transect routes can be seen at Fig. 3. Whilst on the plains usually two driven transect counts were completed each day, one from the camp site in the morning and the other to the next campsite in the afternoon.

32. In all 25 such driven transect counts were carried out (ranging between 15 km and 135 km) over a total of 1511 km. The date and time, coordinates (by GPS) of the start and finish points, length of transect, weather conditions and main habitats of each driven transect were recorded and these details are summarised at Table 3. Most waypoints are shown at Appendix 3.

33. As with the walked morning censuses the driven transect counts data has been used to extrapolate local and region population estimates for each species and the crude population calculations are compared below.

RESULTS

Introduction

34. A summary of the 107 species recorded during the whole of ABBA Survey 40 appears in the systematic list at Appendix 2. Of the total almost half were winter visitors or migrants, about 15 of the resident species were restricted to central Arabia. During the main part of the survey in northern Arabian only about 78 species were recorded, of which 10 were only seen at Al Jauf lake. Of the remainder 33 were likely breeding birds in the area, the others were winter visitors or migrants. Excluding observations at NADEC and TADCO farms and the rocky habitats such as Jebal Tubaiq and Al Hisma, coastal sites and human commensal species, only 16 likely breeding species were recorded on the plains as follows:

Long-legged Buzzard *Buteo rufinus*
Cream-coloured Courser *Cursorius cursor*
Rock Dove *Columba livia*
Desert Eagle-owl *Bubo ascalaphus*
Little Owl *Athene noctua*
Southern Grey Shrike *Lanius meridionalis*
Brown-necked Raven *Corvus ruficollis*
Greater Hoopoe-lark *Alaemon alaudipes*
Thick-billed Lark *Ramphocoris clotbey*
Bar-tailed Lark *Ammomanes cinctura*
Dunn's Lark *Eremalauda dunni*
Desert Lark *Ammomanes deserti*
Crested Lark *Galerida cristata*
Temminck's Lark *Eremophila bilopha*
Mourning Wheatear *Oenanthe lugens*
White-crowned Wheatear *Oenanthe leucopyga*

Birds recorded during walked morning censuses

35. During the 21 walked morning censuses a total of 208 birds of 44 species were recorded. Of these 32 species were potential breeding residents and 12 were winter visitors or migrants. Tables 4 and 5 show (respectively) the potential breeding species and the non-breeding species and numbers of each species observed.

36. Censuses were started at camp sites. Ordinarily about 17 hours were spent at each camp site, from late afternoon to the following morning, and because of this the list of all potential breeding species at each camp sites, included those recorded in the censuses, is a valuable indicator of species diversity at each site. For this reason species seen at the site of the census but not actually during the half hour census are indicated in the census results at Table 4.

37. For resident breeding birds on the plains the censuses recorded very small numbers of birds of a limited range of species. Those censuses which were not to typical plains habitats, such as on irrigated farms and the single census in Jebel Selma south of the survey area proper recorded more species. Of the 21 censuses on two (Nos 12 and 18) no birds were recorded at all and in addition on No 9 no potential breeding birds were recorded. For seven other censuses (Nos. 4, 6, 7, 8, 14, 17 and 19) no non-breeding birds were recorded.

38. On three censuses at NADEC and TADCO farms the Eurasian Collared Dove *Streptopelia decaocto* and Laughing Dove *S. senegalensis* were judged too numerous to count by this census method. However one census carried out at a rocky desert part of TADCO farm recorded only two birds (two species) and did not include the above mentioned doves, which indicates how very local concentrations of human commensal species can be.

39. Population extrapolations from the numbers recorded of certain resident species on the plains during the walked morning censuses can be seen at Table 6.

Birds recorded during driven transect counts

40. The number of each species recorded on the 25 driven transect counts is provided at Table 7.

41. The driven transect count results included records of 19 breeding species and 15 non-breeding species. The results of one transect count (No 26) was very different from the others and has been ignored in the analysis that follows. In No 26 the transect was an area of sandy desert beside a range of small stock enclosures where there was likely to be much spilt grain. In this area 698 Eurasian Collared Dove *Streptopelia decaocto* and 350 House Sparrows *Passer domesticus* were recorded. This site contrasted with most plains transects where neither of these species were present. (NB. There was no Transect No 1).

42. The results of the other transect counts are not easily compared because often habitat and terrain differed. Up to a total of 16 species were seen on a transect (but usually only 6-8). The most commonly recorded resident species were Temminck's Lark (219 on 18 transects), Desert Lark (93 on 14 transects), Crested Lark (83 on 9 transects), Hoopoe Lark (76 on 16 transects) and Bar-tailed Lark (55 on 9 transects). One way of broadly comparing results of the various transects counts is to calculate average densities of birds in a common area, such as a square kilometre. The number of birds found on the 24 analysed transects ranged from zero (Transect No 23 over 68 km) to 238 (Transect No 6 over 93 km). The most commonly recorded non-breeding species were the two *Calendrella* sp larks, which were found in small flocks, mostly in the east, with 476 Greater Short-toed Lark and 78 Lesser Short-toed Lark. The next most numerous wintering species recorded was Eastern Imperial Eagle, with at least 63 individuals counted. The usually common winter visiting chats, Isabelline Wheatear and Desert Wheatear, were 4th and 6th most recorded at 51 and 27 respectively. It should not be concluded that because more eagles were seen than some small passerines the

Table 3: ABBA SURVEY 40: FEBRUARY 2009 - DETAILS OF DRIVEN TRANSECT COUNT SITES - NORTHERN SAUDI ARABIA

No	Date	Times	Waypoints and coords of start point	Waypoint and coords of finishing point	From ABBA Sq	To ABBA Sq	Length of trans. (km)	Approx survey width (m) Note 1	Area of trans (Km ²)	Total Birds Count	Crude calc. of birds per (Km ²)	Crude calc. of birds in an ABBA Sq	Brief notes on habitat including geology, vegetation and land usage
2	01/02/09	1457-1630	Dahna 27°05.065'N, 45°28.075'E	Camp1Feb 27°16.449'N, 45°44.309'E	LA31	LB31	43.5	100	4.35	26	6.0	15717	First 17 km edge of Dahna with sandy strata slightly undulating with typical dune vegetation including <i>Zilla spinosa</i> . Rest of transect was hard, stony and slightly undulating. Almost all the birds were on the latter habitat.
3	02/02/09	0847-1200	Camp1Feb 27°16.449'N, 45°44.309'E	Track3end 27°54.246'N, 45°53.418'E	LB31	LB32	72.6	100	7.26	117	16.1	42378	Initially hard gravel with undulations and then rocky surface. Later vegetation of small herbs, shrubs and asphodel gave way to very poor vegetation on dry flat gravel. In the first part of transect many large 1000+ flocks of sheep and a few camels. Very few later and hardly any birds in last 20 km.
4	02/02/09	1537-1723	Track4 28°30.169'N, 45°59.309'E	Camp2Feb 28°53.921'N, 45°52.504'E	LB34	LB34	61.9	100	6.19	38	6.1	16143	Very dry, very flat stony/sandy surface with here and there a patch or ground hugging vegetation from recent rains.
5	03/02/09	0843-1158	Camp2Feb 28°53.921'N, 45°52.504'E	Trees 28°13.900'N, 46°50.962'E	LB34	MB33	135.0	100	13.5	45	3.3	8765	Very dry flat and stony/sandy surface. Clearly most areas have had no rain for a year or two. One or two patches of sparse vegetation. A single <i>Zizyphus</i> bush. Few flocks.
6	03/02/09	1413-1709	Trans6st 28°04.925'N, 46°42.721'E	Camp3feb 27°21.419'N, 46°51.035'E	MB33	MB31	93.2	100	9.32	238	25.5	67151	Started off very dry and flat stony/sandy surface with mostly no vegetation at all. Gradually got hillier with the last 20 km being hillocks and valleys with some cliffs. Up to 40 m high. Lots of herbs particularly a blue flower with sweet smell. Lots of flocks in this area.
7	04/02/09	0900-1155	Camp3feb 27°21.419'N, 46°51.035'E	Trans7end 27°39.910'N, 47°15.252'E	MB31	NA32	72.4	100	7.24	53	7.3	19250	Chalky limestone outcrops gave way to lower hills and undulations going north and then to some <i>Zizyphus</i> basins and farmland. Recent good rains and ephemeral vegetation. Many flocks. <i>Zizyphus</i> basins and irrigated farms were generally avoided in the transect. (One such basin, which was unavoidable held 5 Eurasian Collared Doves and estimated 100 Spanish Sparrow, these are shown highlighted in the count totals at Table 7 and are not included in all analyses).
8	04/02/09	1612-1719	Trans8st 27°24.716'N, 47°34.771'E	Camp4feb 27°06.082'N, 47°39.001'E	NB31	NB31	36.2	100	3.62	54	43.9	115500	Adjacent to farmland initially, then many flocks. Low undulations, later chalky outcrops of the Summan and then a plateau before more hillocks. Good ephemeral vegetation from recent rains.
9	05/02/09	0855-1142	Camp4feb 27°06.082'N, 47°39.001'E	Pylons 26°35.606'N, 47°57.694'E	NB31	NB30	69.3	100	6.93	103	14.9	39084	Summan, Undulating dry sandy country with chalky limestone outcrops. Very dry in many places
10	06/02/09	1527-1713	Trans10st 28°46.672'N, 44°58.887'E	Camp6feb 28°29.747'N, 44°34.567'E	KB34	KB33	54.2	100	5.42	14	2.6	6792	From Tapline road. Dry sandy to start with, no vegetation or birds. Later stony becoming broken limestone with basins of grasses. Rain and cloud reduced observations. Some bedu in the area.
11	07/02/09	0923-1350	Camp6feb 28°29.747'N, 44°34.567'E	Trans11end 28°53.669'N, 44°39.268'E	KB33	KB34	103.2	100	10.32	175	17.0	44592	Rocky limestone desert with silt pans. Vegetation only in silt pans, quite green but many flocks. Becoming much drier in north and flatter and rockier with no birds at the end, except for a large gathering of eagles.
12	07/02/09	1532-1632	Trans12st 29°00.118'N, 44°33.691'E	Trans12end 29°02.225'N, 44°29.628'E	KB35	KA35	15.2	100	1.52	72	47.4	124561	Rocky, flat gravel for half of distance then depression with limestone cliff (10m) with many <i>Zizyphus</i> bushes.
13	08/02/09	1008-1241	Trans13st 29°47.548'N, 43°12.803'E	Trans13end 29°57.957'N, 42°52.346'E	JA36	IB36	58.5	100	5.85	61	10.4	27420	Low sandy/gravel undulations with limestone outcrops and many vehicle tracks. <i>Zilla spinosa</i> bushes to start but very limited vegetation elsewhere usually only in silt pans. Many very dry stony places
14	08/02/09	1432-1659	Trans14st 30°18.558'N, 42°21.178'E	Camp8feb 30°32.980'N, 42°30.262'E	IA37	IB37	50.3	100	5.03	43	8.5	22480	Sandy, in places a stony surface. Most very dry but a few patches of halophytes and one stock watering area with 3 large eucalyptus trees.
15	09/02/09	0913-1135	Eucalypts 30°33.280'N, 42°29.751'E	Trans15end 30°23.892'N, 42°16.861'E	IB38	IA37	71.8	100	7.18	22	3.1	8057	Sandy undulations to start along border road, with <i>Hamada elegans</i> bushes, final half stony hills very dry and limited scattered vegetation. (Census curtailed by border guards)

No	Date	Times	Waypoints and coords of start point	Waypoint and coords of finishing point	From ABBA Sq	To ABBA Sq	Length of trans. (km)	Approx survey width (m) Note 1	Area of trans (Km ²)	Total Birds Count	Crude calc. of birds per (Km ²)	Crude calc. of birds in an ABBA Sq	Brief notes on habitat including geology, vegetation and land usage
16	09/02/09	1600-1713	Trans16st 30°34.204'N, 40°29.237'E	Camp9feb 30°42.156'N, 40°19.168'E	GA38	GA38	25.0		100	2.5	36	14.4	37867 Stony hills undulating with patches of vegetation in the wadis, rather dry, few stock animals
17	10/02/09	0838-1305	Camp9feb 30°42.156'N, 40°19.168'E	Trans17end 31°11.068'N, 39°59.456'E	GA38	FB39	131.6		100	13.16	80	6.1	15986 Limestone rocky hills to start giving way to sandy gravels and then flat hard gravel. Very dry and although appeared well vegetated it was all dry halophytes. There were no flocks or bedu seen all day. Windy all morning becoming too windy to work by 1300 hrs.
18	11/02/09	0744-0852	Trans18st 31°40.970'N, 38°40.258'E	Trans18end 31°50.603'N, 38°43.768'E	EB40	EB40	20.9		100	2.09	91	43.5	114496 Hard stony plain north of Turaif. Shallow undulations. Dry halophytes large flocks and some bedu camps. Most birds near bedu camps. High winds.
19	11/02/09	1458-1735	T19st 31°24.656'N, 37°27.836'E	Camp11feb 31°15.202'N, 37°43.931'E	DA39	DB39	41.1		100	4.11	89	21.7	56943 Kaf village and other settlements, table topped hills (limestone), harrat covered hills, subkha of Wadi Serhan. High winds affected observations.
20	12/02/09	0950-1300	Camp11feb 31°15.202'N, 37°43.931'E	Water Works 31°09.269'N, 37°37.461'E	DB39	DB39	58.2		100	5.82	79	13.6	35694 Mixed habitat of harrat covered hills, sandy wadis with <i>Raetama ratam</i> bushes, subkhas with bushes including tamarisk, small farms and abandoned date groves. Recent rain but no ephemerals yet. Very dry otherwise. Several flocks/bedu.
21	12/02/09	1551-1725	T21s 30°21.587'N, 37°59.954'E	Camp12feb 30°06.700'N, 37°49.337'E	DB37	DB37	35.6		100	3.56	4	1.1	2955 Bisaita plain, mainly bare gravel plain with very shallow wadis holding a few halophytes and a few birds. Large farm under construction of about 100 sq km. No flocks.
22	13/02/09	0950-1156	Camp12feb 30°06.700'N, 37°49.337'E	T22end 30°08.073'N, 38°02.672'E	DB37	EA37	22.4		100	2.24	46	20.5	54001 Bisaita plain following a very shallow wadi with good vegetation, including an acacia patch. Vegetation mainly <i>Chenopod</i> and <i>Aerva</i> , also <i>Zilla spinosa</i> . Nothing green, no ephemerals, no flocks or bedu.
23	16/02/09	1216-1410	Trans23st 28°52.164'N, 37°55.281'E	Mercasreal 29°22.828'N, 37°35.424'E	DB34	DB35	68.0		100	6.8	0	0.0	0 Hard and stony (sandstone), with sandstone mountains and outcrops. One stop. No vegetation. No flocks or bedu. One small village Mughaya, not visited.
24	17/02/09	1036-1640	Trans24st 29°31.499'N, 37°27.471'E	Camp17feb 29°22.806'N, 37°21.802'E	DA36	DA35	55.4		100	5.54	21	3.8	9968 Sandstone plateau, sandy wadis all very dry, no recent rains. Patches of acacia (some greening) and <i>Raetama ratam</i> .
25	18/02/09	1125-1326	Mercasreal 29°22.828'N, 37°35.424'E	T25end 28°49.356'N, 37°52.125'E	DB35	DB34	69.7		100	6.97	1	0.1	377 Same as transect as No. 23 on 16 Feb (when nothing seen). Hard stony (sandstone) surface with sandstone mountains and outcrops. No vegetation or flocks, no bedu. One small village Mughaya, not visited.
26	23/02/09	1221-1444	T26st 29°45.385'N, 39°56.580'E	T26end 29°46.043'N, 40°00.608'E	FB36	GA36	46.6		100	4.66	1097	235.4	619034 Hard stony (limestone), changing to sand covered stones and dunes and back again. Includes 40 min lunch stop on the dunes. No recent rain and vegetation all looking dead. Many permanent bedu camps and stock enclosures in first 20 km, which were especially attractive to sparrows and doves. For this reason it was decided that the transect was not representative of the north Arabian plain and the results are not included in all analyses.
Total all transects							1511.8				2605		

Notes

1. The census width of 100 m (50 m either side of the vehicle) is a nominal measurement to calculate an approximate area covered by the transects, which allows a simple comparison between transect results. However for individual species the distance of observation, where most birds were thought likely to have been seen, varied a great deal, larger birds can be seen much further away and smaller skulking species might not be seen at all. See text and other tables for details. For the purposes of calculating the birds in an ABBA square the average dimensions of a square in northern Saudi Arabia are taken as 48.25 km west to east and 54.5 km north to south.
2. All transect were off-road. Efforts were made to keep generally to the same habitat/terrain so that counts would be representative of that biotope. For example farms were avoided as these were totally different habitats with many more and different species than found in the open desert.
3. There was no driven transect No 1. The results of Transect 26 were judged to be unrepresentative of plains habitats and therefore the data from this transect were ignored in the population analyses. See also comments on Transect 7.

Table 4. ABBA SURVEY 40: FEBRUARY 2009
WALKED MORNING CENSUSES - NORTHERN SAUDI ARABIA: POTENTIAL BREEDING BIRDS RECORDED

Species	Census number																					Grand total of each species observed during censuses
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
SAND PARTRIDGE <i>Ammoperdix heyi</i>																					2	2
COMMON KESTREL <i>Falco tinnunculus</i>		"								1	1		1									3
LAPPET-FACED VULTURE <i>Torgos tracheliotos</i>													1									1
LONG-LEGGED BUZZARD <i>Buteo rufinus</i>																				"		
CREAM-COLOURED COURSER <i>Cursorius cursor</i>	"	3		"																		3
ROCK DOVE <i>Columba livia</i>													5	6			"				"	11
EURASIAN COLLARED DOVE <i>Streptopelia decaocto</i>								1		*	*				*			"			"	1
LAUGHING DOVE <i>Streptopelia senegalensis</i>										*	*				*							
NAMAQUA DOVE <i>Oena capensis</i>										1					2							3
DESERT EAGLE-OWL <i>Bubo ascalaphus</i>			"											"		1		"		"	"	1
HUME'S OWL <i>Strix butleri</i>																					"	
LITTLE OWL <i>Athene noctua</i>			"																			
BROWN-NECKED RAVEN <i>Corvus ruficollis</i>								"	"							"	"				"	
FAN-TAILED RAVEN <i>Corvus rhipidurus</i>																	"					
PALE CRAG MARTIN <i>Ptyonoprogne obsoleta</i>													"	2		"						2
GREATER HOOPOE-LARK <i>Alaemon alaudipes</i>	2	4	2	5	"	"	"		"										1	1		15
BAR-TAILED LARK <i>Ammomanes cinctura</i>			"	1			4															5
DESERT LARK <i>Ammomanes deserti</i>			8	9	7			2					"								5	31
DUNN'S LARK <i>Eremalauda dunni</i>				1																		1
CRESTED LARK <i>Galerida cristata</i>			2	1				1		2	3				3							12
TEMMINCK'S LARK <i>Eremophila bilopha</i>	2	3		"		2	"		"													7
SCRUB WARBLER <i>Scotocerca inquieta</i>													1				2				2	5
WHITE-SPECTACLED BULBUL <i>Pycnonotus xanthopygos</i>																					"	
TRISTRAM'S STARLING <i>Onychognathus tristramii</i>																	1					1
MOURNING WHEATEAR <i>Oenanthe lugens</i>																"	1					1
WHITE-CROWNED WHEATEAR <i>Oenanthe leucopyga</i>								4					"			1					1	6
BLACKSTART <i>Cercomela melanura</i>																					3	3
HOUSE SPARROW <i>Passer domesticus</i>			2					"		6					2				"			10
EURASIAN GOLDFINCH <i>Carduelis carduelis</i>															16							16
TRUMPETER FINCH <i>Bucanetes githagineus</i>																				"		
DESERT FINCH <i>Rhodospiza obsoleta</i>										9	1				18							28
HOUSE BUNTING <i>Emberiza striolata</i>																					3	3
Total (Species/Birds)	2/4	3/10	4/14	5/17	1/7	½	1/4	4/8	0/0	7/19+	5/5+	0/0	4/8	2/8	7/41+	2/2	3/4	0/0	1/1	1/1	6/16	171
Total non breeding - Table 5 (Species/Birds)	2/4	2/2	3/4	0/0	½	0/0	0/0	0/0	2/3	5/10	2/4	0/0	2/2	0/0	1/1	½	0/0	0/0	0/0	1/1	2/2	37

Notes

1. Asterisks indicate species which were too numerous to count in a census of this nature. *S. decaocto* was present in hundreds and *S. senegalensis* in dozens.
2. The circle symbol indicates birds that were seen at the census site but not during the actual census. These are included as an indication of the species diversity at each site. On most occasions the observers camped at the site of the census and were present from about 1630 hrs the day before until about 0900 hrs on the day of the census. (These other species are not shown for census Nos 10, 11 & 15 at NADEC and TADCO farms).

Table 5.

ABBA SURVEY 40: FEBRUARY 2009

WALKED MORNING CENSUSES - NORTHERN SAUDI ARABIA: NON BREEDING BIRDS RECORDED

Species	Status at site	Census number																				Grand total of each species	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		21
EURASIAN BUZZARD <i>Buteo buteo</i>	WV										3												3
UNIDENTIFIED <i>AQUILA</i> EAGLE	WV															1							1
EASTERN IMPERIAL EAGLE <i>Aquila heliaca</i>	WV		1								2						2						5
GREATER SHORT-TOED LARK <i>Calandrella brachydactyla</i>	WV/BR	3	1	1																			5
DESERT WARBLER <i>Sylvia nana</i>	WV									2													2
CHIFFCHAFF <i>Phylloscopus collybita</i>	WV/PM										3	3		1									7
UNIDENTIFIED SYLVIA WARBLER <i>Sylvia</i>	?											1											1
BLACKBIRD <i>Turdus merula</i>	WV										1												1
SONG THRUSH <i>Turdus philomelos</i>	WV										1												1
BLACK REDSTART <i>Phoenicurus ochruros</i>	WV													1								1	2
ISABELLINE WHEATEAR <i>Oenanthe isabellina</i>	WV									1											1		2
DESERT WHEATEAR <i>Oenanthe deserti</i>	WV	1		1		2																	4
MOURNING WHEATEAR <i>Oenanthe lugens</i>	WV/BR			2																			2
BLUE ROCK THRUSH <i>Monticola solitarius</i>	WV																					1	1
Total (Species/Birds)		2/4	2/2	3/4	0/0	½	0/0	0/0	0/0	2/3	5/10	2/4	0/0	2/2	0/0	1/1	½	0/0	0/0	0/0	1/1	2/2	37

Notes

1. Status codes: WV = Winter visitor; PM = Passage migrant; BR = Breeding resident.
2. The examples of Mourning Wheatear included here were the WV subspecies *persicus*. The nominate subspecies is included at Table 4 as a breeding resident.

Table 6. ABBA SURVEY 40: FEBRUARY 2009

WALKED MORNING CENSUSES - NORTHERN SAUDI ARABIA: POPULATION EXTRAPOLATIONS OF SELECTED RESIDENT PLAINS SPECIES

Species	Census number																					X	Y	Z
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21			
																						Total of birds counted on relevant censuses (Note 3)	Approx number of birds in a Sq Km. (Note 4)	Calculated number of birds in an ABBA Sq (Note 5)
CREAM-COLOURED COURSER <i>Cursorius cursor</i>		3																				3	0.84	2216
GREATER HOOPOE-LARK <i>Alaemon alaudipes</i>	2	4	2	5															1	1		13	1.22	3201
BAR-TAILED LARK <i>Ammomanes cinctura</i>				1			4															5	2.81	7387
CRESTED LARK <i>Galerida cristata</i>			2	1				1		2	3				3							3	1.69	4432
TEMMINCK'S LARK <i>Eremophila bilopha</i>	2	3				2																7	3.93	10341
Census Width (Note 2)	100	100	100	100	100	100	100	100	100	100	50	100	100	100	100	100	100	100	100	100	100			
Census Length(m)	1700	1700	1200	1600	1700	1800	1527	1200	1600	1200	1300	1600	1300	1260	1400	1000	1300	1100	1400	1400	870			
Census Area (ha)	17	17	12	16	17	18	15	12	16	12	7	16	13	13	14	10	13	11	14	14	9	178 ha (1.78 km ²)		
Total area of relevant censuses																								

Notes

1. Details of morning censuses are at Table 2 and all birds recorded are at Tables 4 & 5.
2. All birds seen or heard during censuses were counted. The width of the census is therefore nominal but probably represents the maximum distance at which most birds were observed. Census 11 had restricted views in a bushy habitat.
3. Censuses not representative of the northern Arabian plain (shaded columns) are not included in the analysis in Columns X, Y & Z.
4. Col Y is Col X/1.78 Sq Km, however an adjustment is made to reflect a likely wider census width for Greater Hoopoe Lark (600 m), which were almost always heard, and Cream-coloured Courser (200m).
5. See Table 3 for details of the average size of an ABBA square in northern Saudi Arabia.

latter were less common. The eagles were often seen at much greater range than the small species and therefore their density, in a square kilometre, was much less. Population density extrapolations of selected species on the driven transect counts can be seen at Table 8.

43. Converting the counts to average populations in a square kilometre produced results of between zero and 47 birds (Table 3).

Populations of birds in Northern Saudi Arabia in February 2009

44. The results of the two census methods have allowed some crude calculations to be made of the population of resident breeding and non-breeding species in terms of density in each square kilometre, in an ABBA square, and for the whole of the north Arabian plain as described above (Tables 7 and 8). Comparative population extrapolations of both census methods on six selected plains resident species is shown at Table 9. Populations are also expressed in terms of breeding pairs.

Birds present at NADEC and TADCO Farms

45. Both these farms occupy regions where the original habitat was only suited to a small number of arid land adapted breeding species and wintering birds that preferred dry open plains. The habitat of the farms is now totally different to what was there previously and consequently the birds inhabiting the farms are changing. On both farms the most numerous species were all human commensals and those species especially attracted to arable farms where there is usually an abundance of green vegetation, invertebrates, spilt grain but above all freely available water.

46. Species seen on the farms in previous years and in 2009 are at Table 1. At NADEC farm, probably because of the earlier season of observation in 2009 some 13 additional winter visitors and migrants species were seen, compared to 1999. However it was especially interesting that four more breeding species were also present on the farm, as follows:

Long-legged Buzzard <i>Buteo rufinus</i>	A species which appears to be attracted to farmlands where it can easily find rodent prey. It would not have been suited to the impoverished arid habitat prior to the farm being established.
Namaqua Dove <i>Oena capensis</i>	A species which has spread throughout Arabia in the last 30 years from the south-west. It appears particularly suited to agricultural and human sites in arid regions.
Barn Owl <i>Tyto alba</i>	A rarely recorded nocturnal species that is particularly attracted to agricultural sites as it preys almost exclusively on rodents and other small mammals. This species is beneficial to farms and it could not have existed in the previous habitat of Al Bisaita.
Southern Grey Shrike <i>Lanius meridionalis</i>	A widespread arid land species in Arabia that requires bushes on which to watch for prey and for nesting. This habitat was not present prior to the establishment of the farm.

47. At TADCO Farm there is a similar situation as at NADEC where a previous impoverished habitat has been transformed into a rich variety of habitats which are mostly attractive to human commensal species and those species finding optimum conditions at agricultural sites. However at TADCO the original habitat was more diversified because of the presence of sandstone outcrops which would have meant a few additional indigenous desert adapted species were present before the farm was created and the same outcrops allow other new species to find breeding sites. At TADCO an additional 14 species of mainly winter visitors were seen in 2009 which were not recorded in 1999. These included several small flocks of Eurasian Linnet *Carduelis cannabina* not previously recorded in northern Saudi Arabia. This species was attracted to seeding weeds on the outer fringe of irrigated pivots. Additional potential

Table 7. ABBA SURVEY 40: FEBRUARY 2009 - DRIVEN TRANSECT COUNTS - NORTHERN SAUDI ARABIA: SPECIES RECORDED

	Transect Number																										Total all counts	Total less Trans 7 (pt) & Trans 26
Mainly resident/breeding species	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26			
COMMON KESTREL <i>Falco tinnunculus</i>		1	1											2												4	4	
LAPPET-FACED VULTURE <i>Torgos tracheliotos</i>																							1			1	1	
LONG-LEGGED BUZZARD <i>Buteo rufinus</i>								1															2			3	3	
CREAM-COLOURED COURSER <i>Cursorius cursor</i>	1	1	2	2	2	2	3	1					5			2										21	21	
ROCK DOVE <i>Columba livia</i>					1	2				5		1						4					3			16	16	
EURASIAN COLLARED DOVE <i>Streptopelia decaocto</i>						5				14		2						35	4		1				698	759	56	
SOUTHERN GREY SHRIKE <i>Lanius meridionalis</i>							1		1	1																3	3	
BROWN-NECKED RAVEN <i>Corvus ruficollis</i>									2	4								2					1	1		10	10	
GREATER HOOPOE-LARK <i>Alaemon alaudipes</i>	5	5	2	11	5	8	4	19		5		1	2			2	1		2	2					2	76	74	
THICK-BILLED LARK <i>Ramphocoris clotbey</i>										1					6						12					19	19	
BAR-TAILED LARK <i>Ammomanes cinctura</i>		2		3	20	2		6					6	2	5				9							55	55	
DESERT LARK <i>Ammomanes deserti</i>		11			3	6		5	6	24	7	4	2		2	2		1	18				2			93	93	
CRESTED LARK <i>Galerida cristata</i>		1				9		9		23	7	4					8		14						8	83	75	
TEMMINCK'S LARK <i>Eremophila bilopha</i>	2	23		4	5	11	2	1	2	13	4	14		15	13	50	16		28		12				4	219	215	
WHITE-SPECTACLED BULBUL <i>Pycnonotus xanthopygos</i>																			1							1	1	
MOURNING WHEATEAR <i>Oenanthe lugens</i> (Note 1)					2												1	1	1			1				6	6	
WHITE-CROWNED WHEATEAR <i>Oenanthe leucopyga</i>											2											2				4	4	
HOUSE SPARROW <i>Passer domesticus</i>				3		3				26	3	25					6	38	1						350	455	105	
DESERT FINCH <i>Rhodospiza obsoleta</i>													6													6	6	
Mainly winter visitors & Migrants																												
EURASIAN SPARROWHAWK <i>Accipiter nisus</i>							1																			1	1	
AQUILA SP					3					3					2	7										15	15	
STEPPE EAGLE <i>Aquila nipalensis</i>					2					3					2											7	7	
EASTERN IMPERIAL EAGLE <i>Aquila heliaca</i>	1	2	2		2		1			22	2	2	1	1	5	15		6					1			63	63	
SHORT-EARED OWL <i>Asio flammeus</i>													1								2					3	3	
BARN SWALLOW <i>Hirundo rustica</i>			3		1			2															1			7	7	
GREATER SHORT-TOED LARK <i>Calandrella brachydactyla</i>	12	8		21	190	1	40	51	1	27	6	5	20				60								34	476	442	
LESSER SHORT-TOED LARK <i>Calandrella rufescens</i>		53	25																							78	78	
DESERT WARBLER <i>Sylvia nana</i>											1					2			1		8					12	12	
CHIFFCHAFF <i>Phylloscopus collybita</i>																							2			2	2	
BLACK REDSTART <i>Phoenicurus ochruros</i>																							1			1	1	
ISABELLINE WHEATEAR <i>Oenanthe isabellina</i>	5	6	1	1	1	6	2	2	2	5	3	2		1	1					1	10				1	51	50	
DESERT WHEATEAR <i>Oenanthe deserti</i>		4	2		1	2	1	6	2	1	3	1									1		3			27	27	
SPANISH SPARROW <i>Passer hispaniolensis</i>						100					30															130	30	
WHITE WAGTAIL <i>Motacilla alba</i>																		2								2	2	
TAWNY PIPIT <i>Anthus campestris</i>														1												1	1	
Total species observed in transect	6	12	8	7	14	12	8	11	6	16	12	11	8	6	8	7	5	8	10	3	7	0	13	1	7			
Breeding resident birds recorded	8	44	5	23	38	49	9	42	9	114	27	51	21	19	26	56	31	81	78	3	25	0	12	1	1062	1834	767	
Winter visitor/migrant birds recorded	18	73	33	22	200	109	45	61	5	61	45	10	22	3	10	24	60	8	1	1	21	0	9	0	35	876	741	
Total birds recorded	26	117	38	45	238	158	54	103	14	175	72	61	43	22	36	80	91	89	79	4	46	0	21	1	1097	2710	1508	

Notes: 1: Mourning Wheatear *Oenanthe lugens* includes wintering race *persicus* in transects 6, 19 & 21 and resident race *lugens* in transects 20 & 24. 2: See Table 3 and comments on Transects 7 and 26 adjustments.

Table 8. ABBA SURVEY 40: FEBRUARY 2009

DRIVEN TRANSECT COUNTS - NORTHERN SAUDI ARABIA: POPULATION EXTRAPOLATIONS OF SELECTED PLAINS SPECIES								
	A. Total number of birds (individuals) recorded during all transects (Table 7)	B. Width (m) of transect (Note 1)	C. The total length of all representative transects was 1465 km (Table 3) and therefore the total area censused for each species is (1465 x Col B = Km ²)	D. Calculated number of birds per Km ² (Col A/Col C)	E. Calculated number of birds in an ABBA Sq (Note 2)	F. Calculated population in area surveyed. The calculated area of the 38 ABBA squares visited in part during the 24 99926 Km ² (Note 2). Population of each species is therefore (Col D x 99926):	G. The total area of the northern plains of Saudi Arabia is calculated to be 231407 Km ² (Note 3). Therefore the calculated total population (individuals) in this region was (Col D x 231407):	H. The estimated breeding pairs of resident species on the northern plain of Saudi Arabia at Col G (Note 5)
Mainly resident/breeding species (Note 4)								
CREAM-COLOURED COURSER <i>Cursorius cursor</i>	21	140	205	0.103	270	10252	23742	7914
BROWN-NECKED RAVEN <i>Coryvus ruficollis</i>	10	600	877	0.011	30	1139	2638	879
GREATER HOOPOE-LARK <i>Alaemon alaudipes</i>	74	100	146	0.506	1331	50578	117128	39043
THICK-BILLED LARK <i>Ramphocoris clotbey</i>	19	80	117	0.162	427	16233	37592	12531
BAR-TAILED LARK <i>Ammomanes cinctura</i>	55	80	117	0.470	1237	46990	108818	36273
DESERT LARK <i>Ammomanes deserti</i>	93	80	117	0.795	2091	79456	184002	61334
CRESTED LARK <i>Galerida cristata</i>	75	80	117	0.641	1686	64077	148389	49463
TEMMINCK'S LARK <i>Eremophila bilopha</i>	215	80	117	1.838	4834	183688	425381	141794
Mainly winter visitors & Migrants (Note 4)								
AQUILA SP	15	2000	2924	0.005		513	1187	
STEPPE EAGLE <i>Aquila nipalensis</i>	7	2000	2924	0.002		239	554	
EASTERN IMPERIAL EAGLE <i>Aquila heliaca</i>	63	2000	2924	0.022		2153	4986	
SHORT-EARED OWL <i>Asio flammeus</i>	3	200	292	0.010		1025	2374	
GREATER SHT-TOED LARK <i>Calandrella brachydactyla</i>	442	80	117	3.779		377627	874503	
LESSER SHORT-TOED LARK <i>Calandrella rufescens</i>	78	80	117	0.667		66640	154324	
DESERT WARBLER <i>Sylvia nana</i>	12	40	58	0.205		20505	47484	
ISABELLINE WHEATEAR <i>Oenanthe isabellina</i>	50	80	117	0.427		42718	98926	
DESERT WHEATEAR <i>Oenanthe deserti</i>	27	80	117	0.231		23068	53420	

Notes

1. The distance at which a species may be seen from a moving vehicle differs according to species, depending on size, habitat, behaviour and conditions (see text). Each species is given a range where it is thought that most birds of that species would be seen. (See text for comments on this assumption). For example most Greater Hoopoe Larks were probably seen at 50 m (total transect width 100 m) whereas most *Aquila* eagles were seen up to 1 km away (total 2 km transect width). In each case a maximum distance is chosen. Note that in Table 3 a common, nominal 100 m transect width is used for all species to calculate crude orders of magnitude of bird present in each Km² and an ABBA half degree square.
2. See Table 3 for the dimensions of an average ABBA square in northern Saudi Arabia.
3. The area referred to in Col G is the whole region between 37° E and 48° E, and north of the Nefud Kebir and the Ad Dahna, south of the borders with Jordan, Iraq and Kuwait; excluding the Harrat al Harrah (which is approximately 13,148 Km²), as shown at Fig. 3.
4. Populations of other breeding/resident species shown at Table 7 were not extrapolated for a variety of reasons. This was mainly because the few individuals seen were not always judged to be in typical habitat (e.g. Rock Dove *Columba livia*, Eurasian Collared Dove *Streptopelia decaocto*, Southern Grey Shrike *Lanius meridionalis*, White-spectacled Bulbul *Pycnonotus xanthopygos*, White-crowned Wheatear *Oenanthe leucopyga*, House Sparrow *Passer domesticus* and Desert Finch *Rhodospiza obsoleta*; or the numbers were probably not clearly representative of the breeding population e.g. Common Kestrel *Falco tinnunculus*, Lappet-faced Vulture *Torgos tracheliotos*, Long-legged Buzzard *Buteo rufinus*. Other migrant and winter visiting species were left out for similar reasons.
5. A rule of thumb to convert individual birds seen in a population to breeding pairs, at the beginning of the breeding season, is to divide individuals by three. This of course varies between species and at other times of the year.
6. Transect 26 results are excluded from the totals in Col A. See Note 3 at Table 3.

Table 9.

ABBA SURVEY 40: FEBRUARY 2009

NORTHERN SAUDI ARABIA - COMPARISON OF POPULATION CALCULATIONS OF SELECTED PLAINS BREEDING SPECIES BY CENSUS METHOD

Source/Calculation	A Calculated population in each Km ²		B Calculated population in each ABBA Square		C Calculated population for the whole plains area of northern Saudi Arabia (231407 km ²)		D Estimated number of breeding pairs on the plains of northern Saudi Arabia (Table 8 Note 5)		E Factor by which calculated populations from walked morning censuses exceed those of driven transect counts
	Walked morning censuses	Driven transect counts	Walked morning censuses	Driven transect counts	Walked morning censuses	Driven transect counts	Walked morning censuses	Driven transect counts	
	Table 6	Table 8	Table 6	Table 8					Col G/Col H
CREAM-COLOURED COURSER <i>Cursorius cursor</i>	0.843	0.103	2216	270	195006	23742	65002	7914	8.2
GREATER HOOPOE-LARK <i>Alaemon alaudipes</i>	1.217	0.506	3201	1331	281675	117128	93892	39043	2.4
BAR-TAILED LARK <i>Ammomanes cinctura</i>	2.809	0.470	7387	1237	650020	108818	216673	36273	6.0
CRESTED LARK <i>Galerida cristata</i>	1.685	0.641	4432	1686	390012	148389	130004	49463	2.6
TEMMINCK'S LARK <i>Eremophila bilopha</i>	3.933	1.838	10341	4834	910028	425381	303343	141794	2.1

Notes

1. The species selected for this analysis are those where it was judged the censuses/transects achieved representative coverage in appropriate habitat.
2. Extrapolated populations of some other species (including non-breeders) can be seen at Appendix 2.

breeding species recorded at TADCO for the first time in 2009 were:

Long-legged Buzzard *Buteo rufinus*

See comments at NADEC above.

Desert Eagle Owl *Bubo ascalaphus*

Like the Long-legged Buzzard this species appears to be increasingly attracted to irrigated farms on account of the abundance of suitable prey, mostly rodents but also birds.

Corn Bunting *Emberiza calandra*

This species has been rarely recorded previously in north-west Saudi Arabia and it has not been recorded singing before in that region. It has colonised agricultural areas of the Eastern Province and the UAE since the 1990's and central Arabia by 2003. The record of singing birds in 2009 near Tabuk suggests it is about to extend its breeding range further in Arabia.

Birds recorded outside the main study area at sites in northern and central Saudi Arabia

48. **Al Jauf lake** This was the only wetlands site visited in northern Saudi Arabia. It held about 590 Common Coot *Fulica atra* and a few Moorhen *Gallinula chloropus* and Little Grebe *Tachybaptus ruficollis*. Some of the Coot may stay to breed but most would have been winter visitors. The Moorhen and Little Grebe probably breed. Tufted Duck *Aythya fuligula* and Pochard *Aythya ferina* were also present and small numbers of six wader species, including two potential breeding species Little Ringed Plover *Charadrius dubius* and Greater Sand Plover *C. leschenaultii*.

49. **Jebal Selma** has a much more diverse habitat than anywhere in the northern areas visited and consequently a range of resident species not seen further north including Sand partridge *Ammoperdix heyi*, Eurasian Griffon *Gyps fulvus*, Hume's Owl *Strix butleri*, Arabian Babbler *Turdoides squamiceps*, Blackstart *Cercomela melanura*, Long-billed Pipit *Anthus similis* and House Bunting *Emberiza striolata*. The Long-billed Pipit pair appeared to be residents which is a significant breeding extension for the species.

50. **Al Hair watercourse** was visited on 30 January when the distance of about 4.5 km, from the bridge of Al Hair old town to the dam (see waypoints, Appendix 3) was walked. This was an area of gardens, some abandoned, date groves, tamarisk scrub and trees, fringing reeds along the watercourse and grassy areas. An estimate was made of the numbers of common birds present in each kilometre is shown at Table 10. The estimates for 30 January 2009 are compared to another study of 15 km of the same watercourse immediately upstream from the dam made on 2 April 1999 (Jennings, 1999b).

51. The results of the two estimates are not directly comparable because they used different methodology. However it appears that three species recorded on both occasions were less numerous in 2009. A median point between the two estimates for the three species observed in both years might be used for broad calculation purposes of populations along the watercourse. Note that the Graceful Prinia *Prinia gracilis*, which only started to colonise the Al Hair watercourse and the Riyadh area in 2001 (Jennings, 2003) has achieved a high population level in only eight years. In 1999 the Laughing

Dove *Streptopelia senegalensis* was recorded along the watercourse but not in sufficient numbers to estimate a population.

52. Other species observed along the watercourse but not at other sites during the rest of the survey included: Mallard *Anas platyrhynchos* (breeding resident), Grey Heron *Ardea cinerea* (breeding resident and winter visitor), Purple Heron *Ardea purpurea* (breeding resident and winter visitor), Red-tailed Wheatear *Oenanthe chrysopygia* (winter visitor) and Indian Silverbill *Lonchura malabarica* (exotic breeding resident).

Table 10: Estimated bird populations along the Al Hair watercourse January 2009 and April 1999.

Species	30/1/2009 Estimate of individuals in a linear km of the watercourse	2/4/1999 Estimate of breeding pairs over 15 km of the watercourse (Jennings, 1999b)	2/4/1999 Equivalent individuals in a linear km (N*3/15)
Common Moorhen <i>Gallinula chloropus</i>	20	375	75
Eurasian Collared Dove <i>Streptopelia decaocto</i>	50	500	100
Laughing Dove <i>Streptopelia senegalensis</i>	10	-	See text
Graceful Prinia <i>Prinia gracilis</i>	100	-	See text
White-cheeked Bulbul <i>Pycnonotus leucogenys</i>	50	375	75

Todhia farm

53. This farm was previously visited in April 1999 and March 2003, a list of birds seen on each visit is at Table 1. A Desert Eagle Owl *Bubo ascalaphus* was recorded for the first time in 2009. The farm manager reported that there had been at least one seen on the farm in previous months. It seems likely that this species does well on arable farms where there is adequate scrub cover because of the good population of rodents in and near crops, stubbles and grain storage areas. Long-legged Buzzard *Buteo rufinus* were also recorded for the first time, a species that is now frequently associated with arable farms in Arabia for the same reason as the owl.

54. Winter visitors on the farm included Eastern Imperial Eagle *Aquila heliaca* and two Ménétries's Warbler *Sylvia mystacea* an uncommon species in central Arabia. The farm manager reported that Cattle Egret *Bubulcus ibis* had recently started to winter at the farm which accords with the species increasing commonality in winter at many other places in Arabia. In a number of places elsewhere in Arabia the latter has eventually stayed to breed.

DISCUSSION AND CONCLUSIONS

Conditions

55. Although rainfall data for the region of northern Saudi Arabia in recent years is not available to the authors, it is quite obvious from observation on the ground and from the reports of local people and officials that the region has suffered a prolonged drought over probably at least the last ten years. Lack of rain over several years had reduced the perennial vegetation to a state of virtual aestivation and ephemerals were very few and limited to areas where there had been recent rain showers. Ultimately all desert birds depend on rainfall and vegetation, either for food in terms of seeds, green leaves or other plant parts or indirectly because they feed on invertebrates or vertebrates which themselves rely on vegetation. An illustration of how vegetation responds to good rainfall is provided at Plate 22. This picture was taken after good rains in April 1992 near the Iraq border. Not a single census site in 2009 (Plates 1-21) has vegetation approaching the levels recorded in 1992.

56. ABBA Survey 40, during February 2009, recorded less species diversity and fewer numbers of birds within species than were noted on previous ABBA Surveys in the region in spring. There had been some rain showers in January, particularly in the eastern part of the survey area which had resulted in the appearance of some green vegetation. Generally speaking more birds and more breeding activity was noted in the east. In the west some species such as Temminck's Lark were still in flocks and not showing any sign of breeding in mid February but the same species was commonly singing, courting and nest building in the east in early February.

Comparison of walked morning censuses in 2009 to previous years

57. The area of northern Saudi Arabian which was the focus of this survey is so extensive that despite several previous ABBA surveys to the region, very few previous walked morning censuses have been made at sites which might be directly compared to those censused in 2009. Ignoring censuses from man-altered sites such as on farms there are only four earlier census results available from the main study area which can be directly compared to 2009 censuses, that is in the same ABBA square and in the same habitat. Three other earlier censuses were found nearby in adjacent ABBA squares. A previous census is also available for Jebal Selma. A summary of these eight earlier censuses and comparisons with census results in 2009 is shown at Table 11. Previous walked morning censuses were carried out using the same methodology as in 2009.

58. It can be seen from Table 11 that although some individual censuses in 2009 returned species and individuals counts higher than comparable earlier censuses, there was on average a greater species diversity and more individual birds present on censuses in previous years for both breeding and non-breeding species. In the case of Jebal Selma twice as many species and five times as many birds were recorded during a previous census of almost identical habitat. The most likely explanation for this is the increasing drought conditions in northern Saudi Arabia. The figures suggest that there were proportionately less non-breeding birds present in 2009 than breeding birds.

59. This is a small sample but on examination of the average numbers of species and individual birds recorded on censuses in 2009, of both breeding and non-breeding species, there were more seen in previous years in comparable censuses in every category.

Table 11: Number of species and individual birds recorded during walked morning censuses in 2009 compared to previous censuses nearby

ABBA Square	Region	Number of species and individual birds recorded				Square of earlier census if different	Date and Reference No
		2009		Previous censuses			
		BR	NB	BR	NB		
BB34	Hisma	3/4	0/0	12/46	2/20	BB33	1.4.1989 Ref 51707
DA35	Jebal Tubaiq	4/8	2/2	5/8	1/1		28.4.1992 Ref 51745
DA36	Jebal Tubaiq	0/0	0/0	1/6	1/1		27.4.1992 Ref 51744
DB39	Nr Qurrayat	4/8	0/0	2/7	3/4		9.3.1988 Ref 51680
IA31	Jebal Selma	6/16	2/2	13/65	5/27		10.3.1986 Ref 51659
LB31	As Summan	2/4	2/4	3/6	1/1		17.2.1993 Ref 51753
MB31	As Summan	4/14	3/4	4/9	2/2	MB32	13.2.1993 Ref 51751
NB31	As Summan	5/17	0/0	2/17	3/5	NA30	16.2.1993 Ref 51752
Average		3.5/4.9	1.1/1.5	5.3/20.5	2.3/7.6		
Change in 2009		-1.8/-15.6	-1.2/-1.5				

Notes

For each category the number of species recorded is followed by the total of individual birds noted during the census. BR = Breeding or potentially breeding species, NB = Non-breeding species. Source; Tables 4 and 5 and ABBA database.

Populations of some resident birds species in northern Saudi Arabia in February 2009

60. Analysis of the results of 21 walked morning censuses and 25 driven transect counts revealed that the five most commonly encountered breeding species on the plains of northern Saudi Arabia were as shown at Table 12. The results of the walked census and driven transects has been extrapolated

(Tables 6, 8 and 9), to reveal a suggested range of populations for these breeding species in 2009. The two census methods not unexpectedly produced significantly varying results, between two and eight times more birds were found on the walked censuses compared to driven transects in generally comparable plains habitats. One bias has already been identified at paragraph 29, also the walked morning censuses clearly involved more intensive observation than driven transects, which, no doubt, would have often missed birds made apparent by song or with more cryptic plumage and behaviour. The advantage of the driven transects was that they provided base data for a much larger area.

Table 12: Suggested population levels (breeding pairs) of five common resident bird species on the plains of northern Saudi Arabia, February 2009, from the extrapolation of the results of walked morning censuses and driven transect counts to an area of 231407 km².

Species	Driven transect counts (Breeding pairs)	Walked morning censuses (Breeding pairs)	Factor by which walked census results exceed driven transect counts	Suggested population range (Breeding pairs km ²)
Cream-coloured Courser <i>Cursorius cursor</i>	7914	65002	8.4	0.03 - 0.28
Greater Hoopoe Lark <i>Alaemon alaudipes</i>	39043	93892	2.4	0.17 - 0.41
Bar-tailed Lark <i>Ammomanes cinctura</i>	36273	216673	6.0	0.16 - 0.94
Crested Lark <i>Galerida cristata</i>	49463	130004	2.6	0.21 - 0.56
Temminck's Lark <i>Eremophila bilopha</i>	141794	303343	2.1	0.61 - 1.31

Source: Table 9; see notes on that table.

Populations of winter visiting species in Northern Saudi Arabia in February 2009

61. Unfortunately there are no comparable driven transect counts from previous ABBA Surveys or other studies available which can be viewed with the 2009 results. However there are some relevant observations from previous ABBA Surveys which are indicative of an apparent reduction in the number of birds present in the area during February 2009, see Table 13.

62. There could be several reasons for the failure to make contact with the target species previously known to winter in the area in some number. For example it could be that these species were concentrating on private farms in the regions which were not open to inspection by the survey team. However the most obvious reason is the drought conditions of recent years making it difficult for these species to find suitable food and they had wintered elsewhere.



Plate 22: A shallow wadi in northern Saudi Arabia after good rains (April 1992, ABBA Square GB40). Compare to Plates 1-21 showing walked morning census sites in northern Arabia in February 2009.

63. Other important species were present, notably *Aquila* eagles. During the 1,511 km of driven transect counts a total of 85 *Aquila* eagles were observed; 15 were unidentified, seven Steppe Eagles *Aquila nipalensis* and 63 Eastern Imperial Eagles *Aquila heliaca*. The extrapolation of these counts to the whole of the survey area is shown at Table 8. It has been assumed that most eagles were seen within 1km of the observation vehicle during the driven transects (i.e. a 2 km transect width), therefore the 63 Eastern Imperial Eagles observed becomes, through extrapolation, a theoretical wintering population of over 4,000 birds throughout the region. Del Hoyo et. al. 1994 suggested the world population is only a few thousand breeding pairs, possibly as few as 2,000 pairs, therefore it is clear that this part of northern Arabia holds a very significant part of the world population in winter. This species was often seen in small groups in the open desert associated with dead stock animals, mainly sheep.

64. The number of wintering passerines, such as Isabelline Wheatear *Oenanthe isabellina*, Desert Wheatear *Oenanthe deserti*, Desert Warbler *Sylvia nana* were few and in the first author's experience of these regions numbers were much down on those recorded in previous surveys. Unfortunately there are no good comparative counts or transects on which to judge the magnitude of this supposed reduction. Most noticeable was the lack of *Calendrella* lark species. In the past observations of large flocks of these species were commonplace, indeed such flocks are typical of the region in winter. In 2009 they were, by comparison, almost absent, even so Greater Short-toed Lark *C. brachydactyla* and Lesser Short-toed Lark *C. rufescens* were, together, the most

numerously represented genus of all birds present. The number seen extrapolates to about a million present in the area in February 2009 which suggests that in a wet (green) year when flocks of many hundreds can be seen over a wide area, there may be of the order of 30-50,000,000 of these birds present.

65. A measure of the small number of wintering birds present and the low species diversity can be had from the list of those species seen on the two census methods (Tables 5 and 7). Note that in nine of the 21 walked morning censuses and two of the 25 driven transect counts no wintering birds were seen at all. Table 11 compares the results of eight walked censuses with previous years censuses in the same area. It will be seen that in four censuses in 2009 no non-breeding birds were seen whilst none of the censuses in previous years produced a nil result for non-breeding species. This would appear to be further evidence to support lower numbers of wintering birds in 2009.

Breeding birds: changes in breeding ranges noted in February 2009 and other records

66. One of the most notable absences among breeding birds on the northern plain in 2009 was Dunn's Lark *Eremalauda dunni*. On ABBA Survey 5 to northern Saudi Arabia in February and March 1988 it was recorded as common throughout the region (Jennings et al 1988). In contrast only a single bird was seen in February 2009. This nomadic species was clearly finding the region inhospitable to its needs in 2009 and had left the area, further evidence of the effects of prolonged drought.

67. Some notable increases in breeding ranges of resident species and some other observations are listed below. Range contractions and absences which may be highlighted by the 2009 study are more difficult to illustrate and are not attempted in this superficial review.

Long-legged Buzzard *Buteo rufinus*: A pair were seen at Jebal Tubaiq associated with a nest thought likely to belong to this species, a likely breeding range extension.

Little Ringed Plover *Charadrius dubius*: A pair were observed at Al Jauf lake in suitable breeding habitat, a potential breeding range extension.

Greater Sand Plover *Charadrius leschenaultii*: This species is rare inland but breeds at inland temporary water bodies further north in Syria. A pair were seen at Al Jauf lake in suitable breeding habitat.

Spur-winged Plover *Vanellus spinosus*: A group of 61 were counted at Todhia farm in central Arabia the largest group ever recorded in Arabia. This species continues to expand in range and number in Arabia.

Barn Owl *Tyto alba*: One seen at NADEC farm, a range extension.

Alpine Swift *Tachymarptis melba*: Courting pairs seen at Jubbah, Nefud Kebir, a likely range extension.

White-cheeked Bulbul *Pycnonotus leucogenys*: Several pairs were seen near Al Jauf, a range extension or possible new introduction site.

Table 13: Observation of some key wintering species in northern Arabia during previous ABBA Surveys in February and March; Dotterel *Charadrius morinellus*, Black-bellied Sandgrouse *Pterocles orientalis* and Pin-tailed Sandgrouse *Pterocles alchata*; and comparison with results of Survey No 40 in February 2009.

Species	Date	ABBA Survey	Square Ref	Observation details	2009 Observations
Dotterel	7.3.1988	5	FA40	250 in four groups	None were present in 2009 despite a specific search for the species
ditto	13.3.1988	5	EB39	Group of 7	
ditto	17.3.1988	5	EA35	Group of 10	
ditto	11.2.1993	14	NB34	Group 76	
ditto	12.2.1993	14	MB24/ NA34	Five groups 20,10,63,125, 25	
ditto	16.2.1993	14	MB31	Group of 15	
Black-bellied Sandgrouse	3.3.1988	5	LB34	20	None were present in 2009
ditto	7.3.1988	5	FA40	20	
Pin-tailed Sandgrouse	6.3.1988	5	GA40	At least 700 in groups of 50-100	None seen in these areas despite a specific search for sandgrouse throughout northern Arabia, but 3 or 4 small groups (up to 18 together were seen at TADCO farm, 19-20 February. (12 were at TADCO farm on 15 April 1999)
ditto	7-8.3.1988	5	FA40- FA41	About 1000 in groups of 50-100	
ditto	13.2.1993	14	NA32	Group of 200	
ditto	17.2.1993	14	LB31	3 groups totalling 1206 birds	

White-spectacled Bulbul *Pycnonotus xanthopygos*: Recorded in northern Wadi Serhan, a range extension.

White-crowned Wheatear *Oenanthe leucopyga*: A pair in a rocky depression near the Iraq border (KB35) was a new area for this species.

Long-billed Pipit *Anthus similis*: A pair seen in suitable breeding habitat at Jebal Selma, a likely significant range extension from the western Arabian highlands.

Desert Finch *Rhodospiza obsoleta*: A small group roosting in Eucalyptus trees near the Iraq border (IB38) may have been in a new breeding area or a wandering flock.

Corn Bunting *Emberiza calandra* : About 30 at TADCO farm (a rare species in the north east) including at least one singing, suggest the species breeds locally as it now does on arable farms in parts of central and eastern Arabia.

Birds on farms

68. Arable farms are always fenced against grazing stock, as a result ground vegetation matures and seeds, and trees and bushes achieve their natural size. In these circumstances indigenous breeding species are able to exploit a natural habitat to their full advantage and other species are attracted in because by the new habitats provided by farms. At each of the three farms visited between two and four new breeding species were recorded since previous visits. Long-legged Buzzard *Buteo rufinus*, Barn Owl *Tyto alba*, Desert Eagle Owl *Bubo ascalaphus* and Southern Grey Shrike *Lanius meridionalis* are birds that occur naturally in the regions of the farms which have found suitable habitat there for the first time. Namaqua Dove *Oena capensis* and Corn Bunting *Emberiza calandra* are species that have been able to exploit arable farm habitats in the years since large arable farms have been established in Saudi Arabia and are now widely distributed in Arabia.

69. Farms are also attractive to wintering birds and some notable records included Hen Harriers *Circus cyaneus* on NADEC and TADCO farms and Eurasian Linnets *Carduelis cannabina* at TADCO.

ACKNOWLEDGEMENTS

70. No survey of this kind can be mounted and successfully executed without a great deal of help from many people and organisations. At NADEC farm Al Bisaita the team were made very welcome by the Project Manager Eng. Abdullah as Sulaimi and the Farm Manager Salah M. Tambul, who provided excellent food and accommodation and allowed us free range within the farm. We received the same welcome and hospitality at TADCO by the Chief Executive Officer Saad as Swaat who helped our work in many ways. It must be said that we had not originally intended to visit these farms and had turned up at the gates without warning, so the welcome we received at both is truly remarkable and much appreciated. At the NCWCD Ibex Reserve at Jebal Tubaiq the manager Tarmi as Shameri and Chief Ranger Fahad al Qattani made us welcome, and extended much help and generosity towards us. The first author has visited Todhia farm near Al Kharg on three occasions since 1999 and has always been made very welcome by the King family. Alan King the Manager and his wife Natalie were very kind during an unannounced visit, providing hospitality and allowing free range to the farm as previously and even mechanical assistance to an ignominiously stuck vehicle on the last day of the survey. As ever the survey team received much help and assistance from colleagues in the NCWCD and especially from the Secretary General Prince Bandar bin Saud bin Mohammad al Saud, who encouraged the survey and ensured it was properly provided with suitable vehicles and equipment. We are very grateful to Duha Alhashimi for translation of the summary.

REFERENCES

- Del Hoyo, J., A. Elliott & J. Sargatal. Eds. 1994. *Handbook of the birds of the world*. Vol 2. Lynx Edicions, Barcelona.
- Dickinson, E.C. Ed. 2003. *The Howard & Moore complete checklist of the birds of the world*. 3rd Edition. Christopher Helm, London.
- Jennings, M. C. 1999a. Birds on farms in Central Saudi Arabia, ABBA Survey 25 - April 1999. *Phoenix* 16:11-15.
- Jennings, M. C. 1999b. Birds along the al Hair watercourse, April 1999. *Phoenix* 16:19.
- Jennings, M. C. 2004. Riyadh Environs & Qatar, Spring 2003 (ABBA Survey 32). *Phoenix* 20:2-4.
- Jennings, M. C., M. I. al Salamah, A. H. al Suhaibani, H. S. A. Yahya & C. E. Qirreh. 1996. *Results of four ornithological surveys to the southern Tihama of Saudi Arabia, north eastern Saudi Arabia, northern Oman and north western Saudi Arabia, during the period December 1992 to April 1994*. NCWCD Riyadh Tech. Report No.36, (pp.65).
- Jennings, M. C., M. O. al Toum & A. A. A. al Issa. 1988. *Atlas of the Breeding Birds of Arabia: Survey 5, Results of an Ornithological Survey of Northern Saudi Arabia: 27 February - 26 March 1988*. NCWCD Technical Report 10, (pp65).

Appendix 1.

ABBA SURVEY 40: NORTHERN SAUDI ARABIA (FEBRUARY 2009)

GAZETTEER OF PLACES VISITED ABBA Sq

Ar'ar, inhabited place, northern Saudi Arabia	HA38
Artiwyah, inhabited place, northern Saudi Arabia	LA29
Asrat, Wadi al, Jebal Tubaiq, northern Saudi Arabia	DA35
Bisaita, arid plain, northern Saudi Arabia	DB37
Dahna, ad, long strand of sand seas, northern and eastern Saudi Arabia	JA34-OA23
Dawmat al Jandal (Al Jauf), inhabited place, northern Saudi Arabia	FB36
Dibdibah, ad, plain northern Saudi Arabia	LB33-NA34
Hafar al Batin, inhabited place, northern Saudi Arabia	LB33
Hail, inhabited place, north central Saudi Arabia	HB32
Hair, al, inhabited place, central Saudi Arabia	MB25
Hajarah, al, region of stony plains, northern Saudi Arabia	KA33-KA34
Halat Amar, inhabited place, northern Saudi Arabia	CA35
Hanidh, inhabited place, north-eastern Saudi Arabia	OB30
Haql, inhabited place, Gulf of Aqaba, Saudi Arabia	AB35
Harrat al Harrah, volcanic region, northern Saudi Arabia	DB39-FA37
Hisma, al, sandstone outcrops and canyons, north-west Saudi Arabia	BB34
Hooj, inhabited place, northern Saudi Arabia	EB34
Ibn Ayish, inhabited place, northern Saudi Arabia	IA37
Jalamid, inhabited place, northern Saudi Arabia	GA39
Jamajim, umm al, inhabited place, northern Saudi Arabia	LA30
Jauf (Dawmat al Jandal), inhabited place, northern Saudi Arabia	FB36
Jubail, inhabited place, Arabian Gulf, Saudi Arabia	PB31
Jubbah, inhabited place, northern Saudi Arabia	GB33
Kaf, inhabited place, northern Saudi Arabia	DB39
Kharg, al, inhabited place, central Saudi Arabia	NA25
Khobar, al, inhabited place, Arabian Gulf coast, Saudi Arabia	QA29
Majma'ah, inhabited place, central Saudi Arabia	LA28
Mughaya, inhabited place (Jebal Tubaiq), northern Saudi Arabia	DB35
NADEC Bisaita, farm, northern Saudi Arabia	EA36
Nefud Kebir, sand sea, north central Saudi Arabia	EA34-IB34
Nisab, inhabited place, northern Saudi Arabia	KB34
Qurrayat, inhabited place, northern Saudi Arabia	DA39
Rafha, inhabited place, northern Saudi Arabia	JB36
Riyadh, inhabited place, central Saudi Arabia	MB26
Sadawi, inhabited place, northern Saudi Arabia	MB33
Sakakah, inhabited place, northern Saudi Arabia	GA37
Selma, Jebal, isolated granite mountain, north central Saudi Arabia	IA31
Serhan Wadi, northern Saudi Arabia	DB39
Summan, as, region of hillocks (limestone) and plains, Saudi Arabia	NA32
Tabuk, inhabited place, northern Saudi Arabia	CA33
TADCO farm, northern Saudi Arabia	CA34
Tarbajal, inhabited place, northern Saudi Arabia	EA37
Todhia farm, central Saudi Arabia	NB25
Tubaiq, Jebal, sandstone region, northern Saudi Arabia	DB35
Turaif, inhabited place, northern Saudi Arabia	EB40
Urayirah, inhabited place, eastern Saudi Arabia	OB28
Wariah, inhabited place, northern Saudi Arabia	NA32

Appendix 2

ABBA SURVEY 40: NORTHERN SAUDI ARABIA - 30 JANUARY - 28 FEBRUARY 2009

SUMMARY OF SPECIES OBSERVATION IN SYSTEMATIC ORDER

The reference number relates to the taxonomic order in Dickinson, 2003.

The primary status of each species is given for northern Arabia generally, if only one site is mentioned then the status shown applies to that site. (Status may vary in other parts of Saudi Arabia). Status codes: BR = Breeding Resident; WV = Winter Visitor (may include some individuals on migration); BV = Breeding Visitor, usually in summer; PM = Passage migrant (some individuals may winter).

The gazetteer and waypoints at Appendices 1 and 3 (and Fig. 1) may be helpful in placing some records.

Summaries of the results of the walked morning censuses and driven transect counts are included for relevant species. A walked morning census in Jebal Selma is not included in these totals as it was outside the main study area and driven transect count No 26 was also excluded as not representative of the north Arabian plain.

34.1 OSTRICH *Struthio camelus* (Extinct): Many fragments of a single egg shell found Jebal Tubaiq, 17 February.

49.5 SAND PARTRIDGE *Ammoperdix heyi* (BR): A pair at al Hair dam, 30 January and another pair Jebal Selma, 26 February.

54.1 COMMON QUAIL *Coturnix coturnix* (BR/PM): A single bird at NADEC farm, 15 February.

66.4 MALLARD *Anas platyrhynchos* (BR/WV): One pair al Hair dam, 30 January.

68.6 POCHARD *Aythya ferina* (WV): A flock of 95, Al Jauf lake, 23 February.

68.8 TUFTED DUCK *Aythya fuligula* (WV): A total of six Al Jauf lake, 23 February.

79.1 LITTLE GREBE *Tachybaptus ruficollis* (BR): One Al Jauf lake, 23 February.

87.1 CATTLE EGRET *Bubulcus ibis* (WV): A few on lawns at Jubail, 6 February and a few at Todhia farm, 27 February. Has recently become a winter visitor at Todhia farm.

87.2 GREY HERON *Ardea cinerea* (BR/WV): Two al Hair dam, 30 January.

87.5 PURPLE HERON *Ardea purpurea* (BR/WV): Two al Hair dam, 30 January.

95.2 COMMON KESTREL *Falco tinnunculus* (BR/WV): An uncommon winter visitor to the plains of northern Arabia, up to four birds seen at about 11 sites, but common on farms where thought to be a widespread breeder. Up to 40 NADEC farm, 15 February. (In the main study area three birds were observed during a total of 20 half-hour walked morning censuses and four recorded during 24 driven transect counts over 1511 km.).

100.2 BLACK KITE *Milvus migrans* (WV): A large roost of about 500 at NADEC farm, 14 February. Three or four at TADCO farm, 19 February.

102.2 GRIFFON VULTURE *Gyps fulvus* (BR/WV): Two Jebal Selma, 26 February.

102.4 LAPPET-FACED VULTURE *Torgos tracheliotos* (BR): One at nest, Wadi al Asrat, Jebal Tubaiq, 17 February (In the main study area one bird was observed during a total of 20 half-hour walked morning censuses and one was recorded during 24 driven transect counts over 1511 km.).

103.1 MARSH HARRIER *Circus aeruginosus* (WV): One over roadside pools, Nuayriyah, 6 February.

104.1 HEN HARRIER *Circus cyaneus* (WV): Probably about five each day at both NADEC and TADCO farms.

104.2 PALLID HARRIER *Circus macrourus* (PM): Two males NADEC farm, 15 February.

104.3 MONTAGU'S HARRIER *Circus pygargus* (PM): One male and a probable female, Todhia farm, 27 February.

107.1 EURASIAN SPARROWHAWK *Accipiter nisus* (WV): Up to three at both NADEC and TADCO farms. One in the al Wariah area, 4 February. (In the main study area one was recorded during 24 driven transect counts over 1511 km.).

111.1 EURASIAN BUZZARD *Buteo buteo* (WV): Up to 15 each day NADEC farm especially orchard areas. Also two TADCO farm, 19 and 20 February. All records apparently of race *vulpinus*. (In the main study area three birds were observed during a total of 20 half-hour walked morning censuses).

112.1 LONG-LEGGED BUZZARD *Buteo rufinus* (BR/WV): One Summan, 5 February; pair possibly nesting Jebal Tubaiq, 17 Feb; singles at two site in the Nefud Kebir and Jebal Selma. Also present at all farms, three NADEC farm, 15 February. (In the main study area three were recorded during 24 driven transect counts over 1511 km.).

113.1 STEPPE EAGLE *Aquila nipalensis* (WV): This species was outnumbered by Eastern Imperial Eagle *Aquila heliaca* in northern Arabia, probably about 4:1. Not always differentiated in eagle counts but up to six seen on six days. There were about as many unidentified aquila sp as there were Steppe Eagles. (In the main study area seven were recorded during 24 driven transect counts over 1511 km.). The extrapolation of driven transect counts suggest the wintering population of the northern plain of Saudi Arabia in February 2009 was 1187 birds.

113.2 EASTERN IMPERIAL EAGLE *Aquila heliaca* (WV): A common wintering species in northern Saudi Arabia. Seen almost every day. Groups of up to 22 eagles together were mostly this species. Also Jebal Selma and Todhia farm. (In the main study area five birds were observed during a total of 20 half-hour walked morning censuses and 63 recorded during 24 driven transect counts over 1511 km.). The extrapolation of driven transect counts suggest the wintering population of the northern plain of Saudi Arabia in February 2009 was 4986 birds. (There were a suggested 554 unidentified *Aquila* eagles).

113.3 GOLDEN EAGLE *Aquila chrysaetos* (BR): One possible, Jebal Tubaiq, 17 February.

126.1 COMMON MOORHEN *Gallinula chloropus* (BR/WV): Few al Hair dam, 30 January and one Al Jauf lake, 23 February.

127.1 COMMON COOT *Fulica atra* (WV): A total of 590 at Al Jauf lake, 23 February.

133.2 SPUR-WINGED LAPWING *Vanellus spinosus* (BR): A few at TADCO farm 19-21 February and a flock of 61 at Todhia farm, 27 February.

135.3 LITTLE RINGED PLOVER *Charadrius dubius* (PM/BS): One pair Al Jauf lake, 23 February.

136.3 GREATER SAND PLOVER *Charadrius leschenaultii* (PM/BS)
One pair Al Jauf lake, 23 February.

141.7 REDSHANK *Tringa totanus* (WV): About eight Al Jauf lake, 23 February.

142.1 MARSH SANDPIPER *Tringa stagnatilis* (PM/WV): One Al Jauf lake, 23 February.

142.4 GREEN SANDPIPER *Tringa ochropus* (PM/WV): Two al Hair dam, 30 January and about 12 Al Jauf lake, 23 February.

143.6 LITTLE STINT *Calidris minuta* (PM/WV): Six Al Jauf lake, 23 February.

144.4 RUFF *Philomachus pugnax* (PM): Four Al Jauf lake, 23 Feb

145.2 CREAM-COLOURED COURSER

Cursorius cursor (BR/WV): Widespread but uncommon in northern Arabia recorded on 11 days, up to 12 each day. Often paired. (In the main study area three birds were observed during a total of 20 half-hour walked morning censuses and 21 recorded during 24 driven transect counts over 1511 km.). The population of the northern Saudi Arabia plain on the basis of census work is suggested to be between 7914 breeding pairs from driven transects to 65002 breeding pairs from walked censuses.

148.5 BLACK-HEADED GULL *Larus*

ridibundus (WV): Few al Khobar area, 5-6 February.

156.1 PIN-TAILED SANDGROUSE *Pterocles alchata* (BR/WV): Three or four small groups (up to 18 together), TADCO farm, 19-20 February.

157.1 ROCK DOVE *Columba livia* (BR): Widespread in small numbers throughout northern Arabia. About 120 coming to water at the rangers camp Jebal Tubaiq reserve, 18 February. (In the main study area 11 birds were observed during a total of 20 half-hour walked morning censuses and 16 recorded during 24 driven transect counts over 1511 km.).

161.1 EURASIAN COLLARED DOVE *Streptopelia decaocto* (BR): Common and widespread throughout northern and central Arabia. North of Al Jauf a group of 500 were present near animal pens. Not found in the dunes of Nefud Kebir. (In the main study area excluding farms only one was observed during a total of 17 half-hour walked morning censuses and 56 recorded during 24 driven transect counts over 1511 km.).

162.1 LAUGHING DOVE *Streptopelia senegalensis* (BR): Widespread and common in northern Arabia but not as common as the previous species and more associated with human sites. Nest with eggs Riyadh, 28 February. (In the main study area no birds were observed during a total of 17 half-hour walked morning

censuses. However the species was common during three farm censuses at NADEC and TADCO).

164.2 NAMAQUA DOVE *Oena capensis* (BR): All observations were from farms, up to 12 a day, the only other record was one near Buraydah, 26 February. (In the main study area three birds were observed during a total of 20 half-hour walked morning censuses).

193.2 ROSE-RINGED PARAKEET *Psittacula krameri* (BR): Central Riyadh.

218.1 BARN OWL *Tyto alba* (BR): One NADEC farm, 15 February.

226.1 DESERT EAGLE-OWL *Bubo ascalaphus* (BR): Widespread in small numbers, recorded on nine days, at MB31, nr Halat Amar, TADCO farm (pair probably breeding), west of Al Jauf, three separate records Nafud Kebir and Todhia farm. (In the main study area one bird was observed during a total of 20 half-hour walked morning censuses).

228.2 HUME'S OWL *Strix butleri* (BR): One calling Jebal Selma, 26 February.

232.1 LITTLE OWL *Athene noctua* (BR): Heard in the Summan, 3 February.

236.2 SHORT-EARED OWL *Asio flammeus* (WV): One Iraq border (IB38) 8 February and two Bisaita plain, 13 February. (In the main study area three were recorded during 24 driven transect counts over 1511 km.). The extrapolation of driven transect counts suggest the wintering population of the northern plain of Saudi Arabia in February 2009 was 2374 birds.

253.1 ALPINE SWIFT *Tachymarptis melba* (PM/BS): About four pairs behaving as if courting and single birds, Jubbah, 24 February.

296.1 GREEN BEE-EATER *Merops orientalis* (BR): Recorded at al Hair watercourse and Todhia farm

297.1 HOPOE *Upupa epops* (BR/PM): Singles, probably migrants at NADEC farm, 15 Feb; nr Al Jauf, 22 February and Todhia farm, 27 February.

479.1 ISABELLINE SHRIKE *Lanius isabellinus* (PM/WV): Singles NADEC farm (*L. I. isabellinus*), 15 February and Todhia farm (*L. I. phoenicuroides*), 27 February.

480.4 SOUTHERN GREY SHRIKE *Lanius meridionalis* (BR/(WV): Very scarce in northern Arabia, records single birds on four days 4-14 February plus about six Todhia farm, 27 February. (In the main study area three were recorded during 24 driven transect counts over 1511 km.).

512.3 HOUSE CROW *Corvus splendens* (BR): About three Haql, Gulf of Aqaba, 21 February.

514.3 BROWN-NECKED RAVEN *Corvus ruficollis* (BR): This species was found to be scarce in northern Arabia. Although seen on most days, apart from two small groups, a total of less than 50 birds were seen between 1-26 February, most were paired. The groups were 23 at a rubbish dump south of Halat Amar, 18 February and ten at TADCO farm, 19 February. (In the main study area ten were recorded during 24 driven transect counts over 1511 km. None were seen during 21 walked morning censuses). Driven transect counts suggest the population of the northern plain of Saudi Arabia is 879 breeding pairs

515.1 FAN-TAILED RAVEN *Corvus rhipidurus* (BR): Recorded in the al Hisma region, 21-22 February and Jebal Selma, 25-26 February.

523.1 GREY HYPOCOLIUS *Hypocolius ampelinus* (WV): Recorded near the Golden Tulip hotel, central Riyadh (up to 14), 31 January and 27 February. Ten at Jubbah 24 February.

535.1 BARN SWALLOW *Hirundo rustica* (PM): Light movement of migrants from 2 February up to about five birds most days, with 15, 22 February and about 20 at Al Jauf lake, 23 February. (In the main study area seven were recorded during 24 driven transect counts over 1511 km.).

536.2 PALE CRAG MARTIN *Ptyonoprogne obsoleta* (BR): Generally absent in northern Arabia away from rocky regions. Noted at Wadi Fajr, Jebal Tubaiq, TADCO farm, al Hisma,

Jubbah and Jebal Selma. Also Todhia farm and al Hair watercourse in central Arabia. (In the main study area two birds were observed during a total of 20 half-hour walked morning censuses).

537.1 RED-RUMPED SWALLOW *Cecropis duarica* (PM/BS): One Jubbah, 24 February.

544.1 GREATER HOOPOE-LARK *Alaemon alaudipes* (BR): Widespread in small numbers throughout the plains of northern Arabia, but not seen every day. Not present NADEC farm, Bisaita. (In the main study area 15 birds were observed during a total of 20 half-hour walked morning censuses and 74 recorded during 24 driven transect counts over 1511 km.). The population of the northern Saudi Arabia plain on the basis of census work is suggested to be between 39043 breeding pairs from driven transects to 93892 breeding pairs from walked censuses.

544.2 THICK-BILLED LARK *Ramphocoris clotbey* (BR): One ash Shubah area, 7 February, group of six GA38, 9 February and 12 Bisaita, 13 February. (In the main study area 19 were recorded during 24 driven transect counts over 1511 km.). Driven transect counts suggest the population of the northern plain of Saudi Arabia is 12531 breeding pairs.

545.1 BAR-TAILED LARK *Ammomanes cinctura* (BR): Small numbers widespread in plains areas east of TADCO farm. (In the main study area five birds were observed during a total of 20 half-hour walked morning censuses and 55 recorded during 24 driven transect counts over 1511 km.). The population of the northern Saudi Arabia plain on the basis of census work is suggested to be between 36273 breeding pairs from driven transects to 216673 breeding pairs from walked censuses.

545.2 DESERT LARK *Ammomanes deserti* (BR): Widespread sometimes common in rocky habitats but not west of Jebal Tubaiq. Also Jubbah, Jebal Selma and Todhia farm. (In the main study area 31 birds were observed during a total of 20 half-hour walked morning censuses and 93 recorded during 24 driven transect counts over 1511 km.). Driven transect counts suggest the population of the northern plain of Saudi

Arabia is 61334 breeding pairs. Walked census results suggest a much higher figure but that it thought to be due to a censusing bias.

545.3 GREATER SHORT-TOED LARK

Calandrella brachydactyla (BR/WV): Small wintering groups widespread on the plains. (In the main study area five birds were observed during a total of 20 half-hour walked morning censuses and 442 recorded during 24 driven transect counts over 1511 km.). The extrapolation of driven transect counts suggest the wintering population of the northern plain of Saudi Arabia in February 2009 was 874503 birds.

546.2 LESSER SHORT-TOED LARK

Calandrella rufescens (BR/WV): One group of about 80, Hafar al Batin, 2 February. (In the main study area 78 were recorded during 24 driven transect counts over 1511 km.). The extrapolation of driven transect counts suggest the wintering population of the northern plain of Saudi Arabia in February 2009 was 154324 birds.

547.1 DUNN'S LARK *Eremalauda dunni* (BR):

A single bird southern Summan, 5 February (during one of the 20 censuses).

547.2 CRESTED LARK *Galerida cristata* (BR):

Generally widespread in small numbers on the outskirts of inhabited areas but abundant near farms. (In the main study area 12 birds were observed during a total of 20 half-hour walked morning censuses and 75 recorded during 24 driven transect counts over 1511 km.). The population of the northern Saudi Arabia plain on the basis of census work is suggested to be between 49463 breeding pairs from driven transects to 130004 breeding pairs from walked censuses.

551.1 TEMMINCK'S LARK *Eremophila bilopha*

(BR): A common lark of the northern plains, sometimes the commonest resident species. Nest building in the east early February but still in flocks in the west in mid to late February. (In the main study area seven birds were observed during a total of 20 half-hour walked morning censuses and 215 recorded during 24 driven transect counts over 1511 km.). The population of the northern Saudi Arabia plain on the basis of

census work is suggested to be between 141794 breeding pairs from driven transects to 303343 breeding pairs from walked censuses.

556.2 SCRUB WARBLER *Scotocerca inquieta*

(BR): Recorded Jebal Tubaiq, al Hisma and Jebal Selma. (In the main study area five birds were observed during a total of 20 half-hour walked morning censuses).

558.1 GRACEFUL PRINIA *Prinia gracilis*

(BR): Near Riyadh and on the al Hair watercourse.

566.2 WHITE-CHEEKED BULBUL *Pycnonotus leucogenys* (BR):

Common in the Riyadh area, also recorded for the first time at Al Jauf, JB29 and Todhia farm.

567.1 WHITE-SPECTACLED BULBUL

Pycnonotus xanthopygos (BR): One northern Wadi Serhan (range extension) and Jebal Selma. (In the main study area one was recorded during 24 driven transect counts over 1511 km.).

586.1 EURASIAN REED WARBLER

Acrocephalus scirpaceus (PM/BS): A warbler singing at al Hair dam, 30 January, was thought to be this species.

589.3 CHIFFCHAFF *Phylloscopus collybita*

(PM/WV): Up to six on 12 days, especially in orchards on farms, probably wintering. (In the main study area seven birds were observed during a total of 20 half-hour walked morning censuses and two recorded during 24 driven transect counts over 1511 km.).

597.4 DESERT WARBLER *Sylvia nana* (WV):

Recorded on five days up to eight each day, as Sadawi to Bisaita. Twice associating with Desert Wheatear *Oenanthe deserti*. (In the main study area two birds were observed during a total of 20 half-hour walked morning censuses and 12 recorded during 24 driven transect counts over 1511 km.). The extrapolation of driven transect counts suggest the wintering population of the northern plain of Saudi Arabia in February 2009 was 47484 birds.

598.4 MÉNÉTRIES'S WARBLER *Sylvia mystacea*

(WV): Two, Todhia farm, 27 February.

610.2 ARABIAN BABBLER *Turdoides squamiceps* (BR): Three Jebal Selma, 26 February.

655.1 COMMON MYNA *Acridotheres tristis* (BR): Common exotic in the Riyadh area.

658.3 TRISTRAM'S STARLING *Onychognathus tristramii* (BR): Two pairs in al Hisma, 22 February. (In the main study area one was observed during a total of 20 half-hour walked morning censuses).

667.5 BLACKBIRD *Turdus merula* (WV): One NADEC farm, 15 February. (In the main study area one bird was observed during a total of 20 half-hour walked morning censuses).

669.8 SONG THRUSH *Turdus philomelos* (WV): One NADEC farm, 14-15 February. (In the main study area one bird was observed during a total of 20 half-hour walked morning censuses).

676.1 BLUETHROAT *Luscinia svecica* (PM/WV): One or two on four days, 13-23 February.

680.1 BLACK SCRUB ROBIN *Cercotrichas podobe* (BR): Al Hair watercourse and Todhia farm.

681.2 BLACK REDSTART *Phoenicurus ochruros* (WV): Up to six on six days, notably on farms. (In the main study area two birds were observed during a total of 20 half-hour walked morning censuses and one was recorded during 24 driven transect counts over 1511 km.).

683.2 COMMON STONECHAT *Saxicola torquatus* (PM/WV): Recorded on 9 days 13-26 Feb, usually up to four each day but about 20 at NADEC farm, 15 February.

684.7 RED-TAILED WHEATEAR *Oenanthe chrysopygia* (WV): One al Hair dam, 30 January.

684.8 PIED WHEATEAR *Oenanthe pleschanka* (PM): One TADCO farm, 19 February, four Todhia farm, 27 February.

685.1 ISABELLINE WHEATEAR *Oenanthe isabellina* (WV): A common wintering species in small numbers but not west of TADCO farm. Common on farms probably at least 40 NADEC farm, 15 February and 20 TADCO farm, 20 February. (In the main study area two birds were observed during a total of 20 half-hour walked morning censuses and 50 recorded during 24 driven transect counts over 1511 km.). The extrapolation of driven transect counts suggest the wintering population of the northern plain of Saudi Arabia in February 2009 was 98926 birds.

685.2 DESERT WHEATEAR *Oenanthe deserti* (BR/WV): Widespread winter visitor, slightly less numerous than Isabelline Wheatear *O. isabellina*. (In the main study area four birds were observed during a total of 20 half-hour walked morning censuses and 27 recorded during 24 driven transect counts over 1511 km.). The extrapolation of driven transect counts suggest the wintering population of the northern plain of Saudi Arabia in February 2009 was 53420 birds.

685.3 MOURNING WHEATEAR *Oenanthe lugens* (BR/WV): Examples of the wintering *persicus* race seen on four days to 11 February and the resident *lugens* race observed at Jebal Tubaiq, TADCO farm, al Hisma, Al Jauf and Jubbah (all sandstone locations). (In the main study area one *lugens* and two *persicus* birds were observed during a total of 20 half-hour walked morning censuses and six (four *persicus* and two *lugens*) recorded during 24 driven transect counts over 1511 km.).

685.6 FINSCH'S WHEATEAR *Oenanthe finschii* (WV): Singles Bisaita, and NADEC farm.

686.2 WHITE-CROWNED WHEATEAR *Oenanthe leucopyga* (BR): Two recorded in a rocky depression at KB35, a range extension. Also small numbers Bisaita, Jebal Tubaiq, TADCO farm, al Hisma, Jubbah and Jebal Selma. (In the main study area six birds were observed during a total of 20 half-hour walked morning censuses and four recorded during 24 driven transect counts over 1511 km.).

687.1 BLACKSTART *Cercomela melanura* (BR): Few Jebal Selma, 26 February.

688.3 BLUE ROCK THRUSH *Monticola solitarius* (PM/WV): Singles on five occasions 19-27 February. (In the main study area one bird was observed during a total of 20 half-hour walked morning censuses).

716.1 HOUSE SPARROW *Passer domesticus* (BR): Widespread and common near human settlements, even construction camps in the Nefud Kebir. Very common on farms. (In the main study area ten birds were observed during a total of 20 half-hour walked morning censuses and 105 recorded during 24 driven transect counts over 1511 km.).

716.2 SPANISH SPARROW *Passer hispaniolensis* (BR/WV): About 100 in a Zizyphus basin NA31, 4 February and 30 in a similar habitat KB35, 7 February. Common at NADEC and TADCO farms, about 500 NADEC, 15 February. Also several groups Jubbah. (In the main study area 30 were recorded during 24 driven transect counts over 1511 km.).

734.2 INDIAN SILVERBILL *Lonchura malabarica* (BR): Group of three al Hair dam, 30 January.

739.2 YELLOW WAGTAIL *Motacilla flava* (PM/BS): One *feldegg* race Todhia farm, 27 February.

740.2 WHITE WAGTAIL *Motacilla alba* (WV): Widespread winter visitor in small numbers, usually 2-3 each day but up to 20 some days and probably 1,000 at Todhia farm, 27 February .mainly on recently cut Alf-alpha. (In the main study area two were recorded during 24 driven transect counts over 1511 km.).

742.2 TAWNY PIPIT *Anthus campestris* (PM/WV): Unaccountably scarce, one IA37, 9 Feb, about ten Todhia farm, 27 February. (In the main study area one was recorded during 24 driven transect counts over 1511 km.).

742.3 LONG-BILLED PIPIT *Anthus similis* (BR): Two on the plain at the base of Jebal

Selma appeared to be a mated pair. A considerable range extension.

744.1 RED-THROATED PIPIT *Anthus cervinus* (PM): One flock of about 250 TADCO farm, 20 February.

751.1 EURASIAN GOLDFINCH *Carduelis carduelis* (BR/WV): About 40 at TADCO farm, 20 February. (In the main study area 16 birds were observed during a total of 20 half-hour walked morning censuses).

752.1 EURASIAN LINNET *Carduelis cannabina* (WV): Several small groups of up to about 15 in each on weedy stubbles TADCO farm, 20 February.

753.1 TRUMPETER FINCH *Bucanetes githagineus* (BR): Coming to water at Jebal Tubaiq reserve rangers camp (up to 20 together) 16 and 18 February. One TADCO farm, 19 February and quite common Jebal Selma, 26 February.

753.2 DESERT FINCH *Rhodospiza obsoleta* (BR): A group of six roosting in tall eucalyptus trees IB38, a range extension, 8 February. Up to 20 at both NADEC and TADCO farms. One Jubbah, 24 February. (In the main study area 28 birds were observed during a total of 20 half-hour walked morning censuses and six. recorded during 24 driven transect counts over 1511 km.).

777.1 CORN BUNTING *Emberiza calandra* (BR/WV): About 30 including at least one singing TADCO farm, 20 February.

778.1 HOUSE BUNTING *Emberiza striolata* (BR): Few Jebal Selma, 26 February.

Appendix 3

ABBA SURVEY NO 40: NORTHERN SAUDI ARABIA (FEBRUARY 2009)

WAYPOINTS

Date/Time	WP No	Waypoint name	Coordinates			ABBA Square	Alt M	Cat
30/01/2009 11:40	1	Al Hair br	24 23.210	N	46 49.491	E MB25	495	21
30/01/2009 13:14	2	Dam	24 25.148	N	46 48.707	E MB25	545	21
01/02/2009 14:56	3	Dahna	27 05.065	N	45 28.075	E LA31	506	21
01/02/2009 16:36	4	Camp1FEB	27 16.449	N	45 44.309	E LB31	445	7
02/02/2009 12:00	5	Track3end	27 54.246	N	45 53.418	E LB32	391	21
02/02/2009 15:36	6	Track4	28 30.169	N	45 59.309	E LB34	318	21
02/02/2009 17:21	7	Camp2Feb	28 53.922	N	45 52.504	E LB34	339	7
03/02/2009 11:55	8	Trees	28 13.900	N	46 50.962	E MB33	299	21
03/02/2009 14:13	9	Trans6st	28 04.925	N	46 42.721	E MB33	325	21
03/02/2009 17:07	10	Camp3feb	27 21.419	N	46 51.035	E MB31	323	7
04/02/2009 12:01	11	Trans7end	27 39.910	N	47 15.252	E NA32	293	21
04/02/2009 16:10	12	Trans8st	27 24.716	N	47 34.771	E NB31	237	21
04/02/2009 17:18	13	Camp4Feb	27 06.082	N	47 39.002	E NB31	279	7
05/02/2009 11:42	14	Pylons	26 35.606	N	47 57.694	E NB30	277	21
06/02/2009 15:25	15	Trans10st	28 46.672	N	44 58.887	E KB34	414	21
06/02/2009 17:11	16	Camp6feb	28 29.747	N	44 34.567	E KB33	470	7
07/02/2009 13:59	17	Trans11end	28 53.669	N	44 39.268	E KB34	416	21
07/02/2009 15:32	18	Trans12st	29 00.118	N	44 33.691	E KB35	394	21
07/02/2009 16:31	19	Trans12end	29 02.225	N	44 29.628	E KA35	404	21
07/02/2009 17:02	20	Camp7feb	29 12.478	N	44 10.107	E KA35	422	7
07/02/2009 09:29	21	Cens5end	28 28.987	N	44 34.558	E KB33	457	21
08/02/2009 10:08	22	Trans13st	29 47.548	N	43 12.803	E JA36	413	21
08/02/2009 12:40	23	Trans13end	29 57.957	N	42 52.346	E IB36	417	21
08/02/2009 14:30	24	Trans14st	30 18.558	N	42 21.178	E IA37	406	21
08/02/2009 16:59	25	Camp8feb	30 32.980	N	42 30.262	E IB38	356	7
09/02/2009 11:32	26	Trans15end	30 23.892	N	42 16.861	E IA37	419	21
09/02/2009 15:58	27	Trans16st	30 34.204	N	40 29.237	E GA38	694	21
09/02/2009 17:13	28	Camp9feb	30 42.156	N	40 19.168	E GA38	736	7
09/02/2009 09:10	29	Eucalypts	30 33.280	N	42 29.751	E IA38	375	19
10/02/2009 13:03	30	Trans17end	31 11.068	N	39 59.456	E FB39	803	21
11/02/2009 14:55	31	T19s	31 24.656	N	37 27.836	E DA39	502	21
11/02/2009 18:07	32	Camp11feb	31 15.202	N	37 43.931	E DB39	512	7
11/02/2009 07:44	33	Trans18st	31 40.970	N	38 40.258	E EB40	832	21
11/02/2009 08:51	34	Hoodoot	31 50.603	N	38 43.768	E EB40	876	21
12/02/2009 13:00	35	Water Works	31 09.269	N	37 37.461	E DB39	523	21
12/02/2009 15:51	36	T21s	30 21.587	N	37 59.954	E DB37	592	21
12/02/2009 17:24	37	Camp12feb	30 06.700	N	37 49.337	E DB37	674	7
13/02/2009 11:02	38	Acacia	30 07.740	N	37 55.688	E DB37	647	19
13/02/2009 11:54	39	T22end	30 08.073	N	38 02.672	E EA37	617	21
14/02/2009 15:31	40	NADEC gate	29 52.441	N	38 19.350	E EA36	634	20
15/02/2009 07:11	41	Cens10st	29 53.303	N	38 18.486	E EA36	624	21
16/02/2009 12:08	42	Trans23st	28 52.164	N	37 55.281	E DB34	807	21
16/02/2009 13:49	43	Mughaya	29 17.176	N	37 40.596	E DB35	760	12
16/02/2009 14:39	44	MercasJTubaiq	29 22.827	N	37 35.424	E DB35	817	21
16/02/2009 17:45	45	Camp16feb	29 30.546	N	37 27.828	E DA36	1092	7
16/02/2009 07:10	46	Cens11st	29 51.991	N	38 18.576	E EA36	631	21
16/02/2009 07:53	47	Cens11end	29 51.969	N	38 18.912	E EA36	NR	21
17/02/2009 10:10	48	Ostrich Egg	29 30.511	N	37 27.622	E DA36	NR	21
17/02/2009 10:34	49	T24st	29 31.499	N	37 27.471	E DA36	1089	21
17/02/2009 12:23	50	Descent tubaiq	29 21.874	N	37 19.908	E DA35	1022	21
17/02/2009 16:40	51	Camp17feb	29 22.806	N	37 21.802	E DA35	989	21
18/02/2009 17:29	52	Camp18feb	29 05.114	N	36 08.716	E CA35	758	21
18/02/2009 20:23	53	T25end	28 49.356	N	37 52.125	E DB34	NR	21
19/02/2009 10:16	54	Hejaz station	29 02.735	N	36 10.040	E CA35	683	0
19/02/2009 13:22	55	Tadco HQ	28 44.725	N	36 17.736	E CA34	759	20
19/02/2009 14:26	56	NWTadco	28 48.073	N	36 09.468	E CA34	751	0
20/02/2009 15:29	57	Southtadco	28 30.746	N	36 10.589	E CA34	808	0
20/02/2009 17:24	58	Camp20feb	28 43.376	N	36 14.127	E CA34	768	7
21/02/2009 14:47	59	Haql	29 17.280	N	34 57.049	E AB35	73	12
21/02/2009 17:08	60	Camp21feb	28 49.862	N	35 33.372	E BB34	1130	7
22/02/2009 15:53	61	Hooj	28 58.746	N	38 33.869	E EB34	824	12
22/02/2009 18:09	62	Camp22feb	29 52.695	N	39 27.626	E FA36	695	7
22/02/2009 07:40	63	Cens17end	28 49.766	N	35 32.890	E BB34	1112	21
23/02/2009 11:11	64	Jauf Lake	29 48.596	N	39 54.427	E FB36	603	19
23/02/2009 12:20	65	T26st	29 45.385	N	39 56.580	E FB36	673	21
23/02/2009 14:43	66	T26end	29 46.043	N	40 00.608	E GA36	668	21
23/02/2009 17:52	67	Camp23feb	28 29.226	N	40 28.900	E GA33	865	7
24/02/2009 16:49	68	Eowl	28 32.650	N	40 27.047	E GA34	879	0
24/02/2009 17:27	69	Camp24feb	28 57.950	N	40 11.778	E GA34	841	7
25/02/2009 18:10	70	Camp25feb	27 05.700	N	42 09.653	E IA31	1078	7
26/02/2009 11:40	71	Crater	27 11.316	N	42 22.772	E IA31	952	19
26/02/2009 07:23	72	D30	27 05.658	N	42 09.127	E IA31	1111	0
27/02/2009 22:49	73	Todhia entranc	24 11.965	N	47 59.578	E NB25	NR	0

CATEGORIES

Code	DESCRIPTION
0	Not categorised
7	Camp site with census
12	Settlement
19	Bird/Natural site
20	Other accomodation
21	Census end or intermediate point